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TRANSCRIPT OF RECORD.

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1890.

No. 294.

THE INTERNATIONAL TOOTH CROWN COMPANY,
APPELLANT,

vs.

EDWARD S. GAYLORD AND JOHN S. WILLIAMS.

APPEAL FROM THE CIRCUIT COURT OF THE UNITED STATES FOR
THE DISTRICT OF CONNECTICUT.

FILED NOVEMBER 8, 1887.

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a Circuit Court of the United States, District of Connecticut.
In Equity.

THE INTERNATIONAL TOOTH CROWN CO.
vs.
EDWARD S. GAYLORD and J. S. WILLIAMS.
No. 491. In Equity.

The above-named complainant, conceiving itself aggrieved with the final decree entered on the 22d day of September, 1887, in the above-entitled cause, does hereby appeal therefrom to the Supreme Court of the United States, and it prays that its appeal may be allowed, and that a transcript of the record, proceedings, and evidence in the cause, duly authenticated, may be sent to the Supreme Court.

DICKERSON & DICKERSON,
Solicitors for Complainant.

Appeal allowed Oct. 14th, 1887.

E. HENRY LACOMBE,
Circuit Judge.

b Circuit Court of the United States of America for the District of Connecticut, in the Second Circuit.

THE INTERNATIONAL TOOTH CROWN COMPANY,
Complainant and Appellant,
vs.
EDWARD S. GAYLORD and J. L. WILLIAMS, Defendants and Respondents.
Bond for Damages and Costs.

Know all men by these presents that we, the International Tooth Crown Company, above-named, as principal, and Washington W. Sheffield and Harriet P. Sheffield and Hezekiah Goddard, as sureties, are held and firmly bound unto the above-named defendants in the sum of two hundred and fifty dollars, to be paid to the said defendants; for the payment of which, well and truly to be made, we bind ourselves and each of us, our and each of our successors, heirs, executors, and administrators, jointly and severally, firmly by these presents.

Sealed with our seals and dated the eighth day of October, in the year of our Lord one thousand eight hundred and eighty-seven.

Whereas the above-named International Tooth Crown Company has prosecuted its appeal to the Supreme Court of the United States to reverse the decree rendered in the above-entitled suit by the judge of the circuit court of the United States for the district of Connecticut:

c Now, therefore, the condition of this obligation is such that if the above-named complainant shall prosecute its appeal to effect and answer all damages and costs if it fails to make its said appeal good, then this obligation shall be void; otherwise the same shall be and remain in full force and virtue.

THE INTERNATIONAL TOOTH CROWN COMPANY,
Per LUCIUS T. SHEFFIELD, *Secretary*.
WASHINGTON W. SHEFFIELD. [SEAL.]
HARRIET P. SHEFFIELD. [SEAL.]
HEZEKIAH GODDARD.

Sealed and delivered and taken and acknowledged this eighth day of October, 1887, before me—

[SEAL.] HENRY C. WEAVER,
Notary Public in and for New London, Connecticut.

UNITED STATES OF AMERICA,
District of Connecticut, County of New London, } *ss:*

Washington W. Sheffield and Harriet P. Sheffield, being duly sworn, depose*s* and say*s* that they are householders and *and* freeholders within the State and district above named, and that they are worth the sum of five hundred dollars over and above all their just debts and liabilities.

WASHINGTON W. SHEFFIELD.
HARRIET P. SHEFFIELD.

Sworn to this eighth day of October, A. D. 1887, before me—

HENRY C. WEAVER,
Notary Public for New London County, State of Connecticut.

d UNITED STATES OF AMERICA,
District of Connecticut, County of New London, } *ss:*

Hezekiah Goddard, being duly sworn, deposes and says that he is a householder and freeholder within the State and district above named, and that he is worth the sum of five hundred dollars over and above all his just debts and liabilities.

HEZEKIAH GODDARD.

Sworn to this 8th day of October, A. D. 1887, before me—

[SEAL.] HENRY C. WEAVER,
Notary Public in and for New London County.

Approved as to form, amount, and sufficiency of surety.

E. HENRY LACOMBE,
District Judge.

Due and timely service of a copy of the within bond admitted.

JOHN K. BEACH,
Sol. for Def'ts.

e By the Honorable E. Henry Lacombe, one of the judges of the circuit court of the United States for the district of Connecticut.

UNITED STATES OF AMERICA, } *ss:*
District of Connecticut, }

Whereas the International Tooth Crown Company has appealed to the Supreme Court of the United States from a decree lately rendered in the circuit court of the United States for the District of Connecticut, made in favor of you, the said Edward S. Gaylord and J. L. Williams:

Therefore you are hereby cited to appear before the said Supreme Court, at a term thereof to be holden at Washington on the second Monday of October, 1887, on the third Monday of said term, to do and receive what may appertain to justice to be done in the premises.

Given under my hand, at the city of New York, in the second circuit, on the 14th day ef Oct., 1887.

E. HENRY LACOMBE,
Circuit Judge.

Due service of a copy of the within citation is hereby admitted. Dated Oct. 17, 1887.

JOHN K. BEACH,
Sol. for Appellee.

The Return of the Judges of the Circuit Court of the United States for the District of Connecticut to the Foregoing Appeal.

The record of the pleadings, evidence, and proceedings as agreed upon by the parties and filed in this court follows in these words, viz:

f U. S. Circuit Court, District of Connecticut. In Equity.

INTERNATIONAL TOOTH CROWN COMPANY }
vs.
EDWARD S. GAYLORD and J. L. WILLIAMS. }

It is hereby stipulated by and between the solicitors for the respective parties that the within record is, and it is hereby made, the record on appeal to the Supreme Court of the United States in the above-entitled case.

And it is further agreed that the within is the record to be filed with the clerk of the circuit court for the district of Connecticut in the above-entitled case, and that the said record be filed by said clerk *nunc pro tunc* as of the date of the argument of said cause.

DICKERSON & DICKERSON,
Complainant's Solicitors.
JOHN K. BEACH,
Defendants' Solicitor.

1 Circuit Court of the United States, District of Connecticut.

INTERNATIONAL TOOTH CROWN COMPANY
against
EDWARD S. GAYLORD and J. L. WILLIAMS.
} In Equity.

To the honorable the judges of the circuit court of the United States in and for the district of Connecticut:

The International Tooth Crown Company, a corporation organized under and pursuant to the laws of the State of New York and a citizen of said State, and having its principal place of business in the city of New York, in said State, brings this its bill of complaint against Edward S. Gaylord and J. L. Williams. both of New Haven, Connecticut, and citizens of said State of Connecticut.

2 And your orator further shows that heretofore and before the 22nd day of May, 1883, said Cassius M. Richmond, as your orator is informed and believes, was the original and first inventor of a certain new and useful improvement in artificial dentures not known or used by others in this country and not patented or described in any printed publication in this or any foreign country before his invention or discovery thereof, and not in public use or on sale for more than two years prior to his application for a patent therefor.

And your orator further shows unto your honors that the said Cassius M. Richmond, so being the inventor of said improvement, made application to the Commissioner of Patents, in accordance with the then existing laws of the United States, and complied in all respects with the conditions and requirements of said laws.

And thereafter, on the 22nd day of May, 1883, letters patent of the United States numbered 277,941, signed, sealed, and executed in due form of law and bearing date the day and year last aforesaid, were issued to the Richmond Tooth Crown Company, as assignee by mesne assignments of said Cassius M. Richmond, whereby there was secured to the said Richmond Tooth Crown Co. and to its successors, heirs, and assigns, for the term of seventeen years from the 22nd day of May, 1883, the full and exclusive right of making, using, and vending the said improvement throughout the United States and the territories thereof, as by a certified copy of said letters patent, in court to be produced, will more fully appear.

3 And thereupon your orator complains and says that heretofore and before the 22nd day of May, 1883, one Cassius M. Richmond, as your orator is informed and believes, was the original and first inventor of a certain new and useful improvement in preparing roots of teeth for the reception of artificial dentures, not known or used by others in this country and not patented or described in any printed publication in this or any foreign country before his invention or discovery thereof, and not in public use or on sale for more than two years prior to his application for a patent therefor.

And your orator further shows unto your honors that the said Cassius M. Richmond, so being the inventor of said improvement, made application to the Commissioner of Patents in accordance with the then existing laws of the United States and complied in all respects with the conditions and requirements of said laws.

And thereafter, on the 22nd day of May, 1883, letters patent of the United States numbered No. 277,943, signed, sealed, and executed in due form of law and bearing date the day and year last aforesaid, were issued to the Richmond Tooth Crown Company, as assignee by mesne assignments of said Cassius M. Richmond, whereby there was secured to the said Richmond Tooth Crown Company and its successors, heirs, and assigns, for the term of seventeen years from the 22nd day of May, 1883, the full and exclusive right of making, using, and vending the said improvement throughout the United States and the territories thereof, as by a certified copy of said letter- patent, in court to be produced, will more fully appear.

4 And your orator further shows that by an instrument in writing, bearing date the 23rd day of June, 1883, the said Richmond Tooth Crown Company, in pursuance of a written contract to that effect duly executed by it on the 3rd day of February, 1883, duly assigned, transferred, and set over unto Washington W. Sheffield and L. T. Sheffield all its right, title, and interest in and to said letters patent No. 277,941 & 277,943 and the invention thereby secured; which said assignment was duly recorded on the — day of ——, 18—, in the Patent Office of the United States, in Liber K 31, page 16, as by said assignment, with the certificate of recording thereto affixed, or a duly certified copy of said assignment, in court to be produced, will more fully and at large appear.

5 And your orator further shows that by an instrument in writing, bearing date the 23rd day of June, 1883, the said Washington W. Sheffield and L. T. Sheffield, in pursuance of a written contract to that effect by them duly executed on the 19th day of February, 1883, duly assigned, transferred, and set over unto your orator, The International Tooth Crown Company, all their right, title, and interest in and to said letters patent and the invention thereby secured, which said assignment was duly recorded on the — day of —— 18—, in the Patent Office of the United States, in Liber K 31, page 19, as by said assignment, with the certificate of recording thereto affixed, or a duly certified copy of said assignment, in court to be produced, will more fully and at large appear.

6 And your orator further shows unto your honors that by reason of the said transfers your orator is now possessed of all the right, title, and interest which the said Richmond Tooth Crown Company had to said several letters patent and is now the successor in interest of the said Richmond Tooth Crown Company, and is the owner by assignment of all rights, licenses, and agreements heretofore granted by said Richmond Tooth Crown Company, and especially of a certain license executed on the 5th day of January, 1883, by said Richmond Tooth Crown Company and the said J. L. Williams, and of all rights of the said Richmond Tooth Crown Company under or by virtue of said license.

And your orator further shows unto your honors that a certain agreement of license was entered into on or about the 5th day of January, 1883, by and between the Richmond Tooth Crown Company, your orator's assignor, and J. L. Williams, the defendant in this case, a copy whereof is annexed to this bill and made part thereof.

And your orator further shows unto your honors that the said license and agreement entered into between the said Richmond Tooth Crown Company and the said J. L. Williams was a license and agreement under and concerning the said letters patent to C. M. Richmond, No. 277,941 and 277,943, hereinbefore referred to, and of certain other letters patent at that time owned by the Richmond Tooth Crown Company.

7 And your orator further shows unto your honors that the applications for said several letters patent to C. M. Richmond hereinbefore referred to were at the time of the execution of the said agreement with the said J. L. Williams filed in the Patent Office and owned by the said Richmond Tooth Crown Company, assignor to your orator.

And your orator further shows unto your honors that the said right or license under the said letters patent so conveyed to the said J. L. Williams expired by its own limitation on the 5th day of January, 1884.

And your orator further shows unto your honors that by said agreement the said defendant herein acknowledged the validity of the said several letters patent here sued upon and of each and every claim thereof and agreed that he would not contest the said claims or the said validity in any court in the United States; and the said J. L. Williams further agreed that upon the expiration of said license, whether by his breach of the covenants thereof or by lapse of time, he would keep and observe every covenant, agreement, or stipulation therein in regard to the validity of said letters patent and all of them and the title thereto.

And your orator therefore shows unto your honors that by reason of said covenants hereinbefore referred to and the other covenants contained in said agreement the said J. L. Williams is estopped from denying the validity of said letters patent or his infringement thereof.

8 And your orator further shows unto your honors that a certain agreement and license in writing was duly entered into and executed between and by your orator and said defendant, Edward S. Gaylord, on or about the 28th day of February, 1883, a copy whereof is annexed to this bill and made a part thereof.

And your orator further shows unto your honors that the said agreement and license entered into and executed as aforesaid was a license and agreement under and concerning the said letters patent No. 277,941 and 277,943, hereinbefore referred to, and of certain other letters patent at that time owned by your orator.

And your orator further shows unto your honors that the application for said letters patent No. 277,941 and 277,943, hereinbefore referred to, was at the time of the execution of the said agreement and license with said Edward S. Gaylord duly filed in the Patent Office and was owned by your orator, the said International Tooth Crown Company.

And your orator further shows unto your honors that the said right and license under the said letters patent so conveyed to the said Edward S. Gaylord was revoked and terminated by your orator, according to the terms thereof, on account of the failure of said Gaylord to comply with its terms and conditions, and that due notice of said termination was given by your orator.

And your orator further shows unto your honors that in and by said agreement the said defendant, Edward S. Gaylord, duly acknowledged the validity of the said several letters patent here sued upon and of each and every claim thereof and agreed that he would not
contest the said claims or the said validity in any court in
9 the United States; and the said Edward S. Gaylord further
agreed that upon the expiration of said license, whether by
his breach of the covenants thereof or by lapse of time, he would keep and observe every covenant, agreement, and stipulation therein in regard to the validity of said letters patent and all of them and the title thereto.

And your orator therefore shows unto your honors that by reason of said covenants hereinbefore referred to and the other covenants contained in said agreement and license the said Edward S. Gaylord is estopped from denying the validity of said letters patent herein sued upon or his infringement thereof.

And your orator further shows that heretofore, to wit, on the 3rd day of December, 1883, your orator filed a bill in equity in the circuit court of the United States for the southern district of New York against Cassius M. Richmond and A. S. Richmond for the infringement of said letters patent Nos. 277,941 and 277,943 and others; that a motion for a preliminary injunction was made therein on the fourteenth day of December, 1883, before his honor Judge Wallace; that said motion was contested and fully argued by counsel, and the question of the validity of said letters patent was fully considered, and that thereafter the said court granted a preliminary injunction against the said defendants, Cassius M. Richmond and Alvan S. Richmond, restraining them from infringement of said letters patent
during the pendency of said cases and ordering, adjudging,
10 and decreeing that said letters patent Nos. 277,941 and
277,943 are good and valid in law.

And your orator further shows that on the 8th day of December, 1884, your orator brought a like suit on the said letters patent in said circuit court of the United States for the southern district of New York against W. Farley Muller, and a motion for a preliminary injunction was made therein on the 9th day of January, 1885; that the question of the validity of said letters patent was again fully considered and argued, and an injunction was ordered therein on the 10th day of January, 1885, and duly issued on the same day.

11 And your orator further shows that but for the infringe-
ment herein complained of and others of like character your

orator would still be in the undisturbed possession, use, and enjoyment of the exclusive privilege secured by the said several letters patent and in receipt of the profits of the same.

And your orator further show- unto your honors that it is informed and believe-, that since the date of the expiration and revocation of said licences the defendants herein named, well knowing all the facts hereinbefore set forth and against the will of your orator and in violation of your orator's rights, have been — are now jointly infringing said letters patent by making, using, and selling in one apparatus and operation the said patented improvements or the substantial and material parts thereof within the district of Connecticut and elsewhere within the United States, all which acts and doings are contrary to equity and good conscience and tend to the manifest injury of your orator in the premises.

12 Forasmuch as your orator can have no adequate relief except in this court, and to the end, therefore, that the defendants may, if they can, show why your orator should not have the relief hereby prayed, and may make a full disclosure and discovery of all the matters aforesaid, and upon their corporal oath and according to the best and utmost of their knowledge, remembrance, information, and belief full, true, direct, and perfect answer make to the matters hereinbefore stated and charged.

And that the defendants may be decreed to account for and pay over the income or profits thus unlawfully derived from the violation of the rights secured by said letters patent and now vested in your orator as aforesaid, and be restrained from any further violation of said rights, your orator pray- that your honors may grant a writ of injunction, issuing out of and under the seal of this honorable court, perpetually enjoining and restraining the said defendant-, their clerks, attorneys, agents, servants, and workmen, from any further construction, sale, or use in any manner of said patented improvement or any part thereof in violation of your orator'- rights as aforesaid, and that the material now in possession or use of the said defendants may be destroyed or delivered up to your orator for that purpose.

And that your honors, upon the rendering of the decree above prayed, may assess or cause to be assessed, in addition to the profits to be accounted for by the defendant- as aforesaid, the damages your orator has sustained by reason of such infringement, and that your honors may increase the actual damages so assessed to a sum equal to three times the amount of such assessment under the circumstances of the willful and unjust infringement by said defendant- as herein set forth.

And your orator further pray- that a provisional or preliminary injunction be issued restraining the said defendants from any further infringement of said letters patent pending this cause, and for such other and further relief as the equity of the case may require and to your honors may seem meet.

13 May it please your honors to grant unto your orator not only a writ of injunction conformable to the prayer of this bill, but also a writ of subpœna of the United States of America,

directed to the said Edward S. Gaylord and J. L. Williams, commanding them on a day certain to appear and answer unto this bill of complaint and to abide and perform such order and decree in the premises as to the court shall seem proper and required by the principles of equity and good conscience.

DICKERSON & DICKERSON,
Solicitors for Complainant and of Counsel.
INTERNATIONAL TOOTH CROWN COMPANY,
Per LUCIUS T. SHEFFIELD, *Treasurer.*

14 UNITED STATES OF AMERICA,
Southern District of New York, } *ss:*

On this 7th day of May, 1885, before me personally appeared Lucius P. Sheffield, treasurer of the complainant above named, who, being by me duly sworn, deposes and says that he is the treasurer of the complainant corporation above named, and that he has read the foregoing bill of complaint subscribed by him and knows the contents thereof, and that the same is true of his own knowledge except as to the matters therein stated on information and belief, and as to those matters he believes it to be true.

LUCIUS P. SHEFFIELD, *Treasurer.*

Sworn to and subscribed before me this 7th day of May, 1885.

OTTO BAUMAN,
Notary Public, N. Y. C. (208).

15 *Gaylord License, Referred to in Foregoing Bill.*

Whereas International Tooth Crown Company of the city, county, and State of New York is the owner of certain letters patent heretofore granted for improvements in artificial dentures, especially for the inventions of Cassius M. Richmond and Alvin S. Richmond; and whereas the said company is now the owner of several applications for letters patent for improvement in artificial dentures, and will hereafter become possessed of other letters patent relating to said subject hereafter to be granted or acquired; and whereas Edw. S. Gaylord, of New Haven, county of New Haven, and State of Connecticut, is desirous of acquiring the right or privilege of using the said inventions and of working the said processes and of using the said improvements in artificial dentures according to the specifications of the letters patent above described, it being hereby expressly admitted, declared, stipulated, covenanted, and agreed by the said Edw. S. Gaylord that said letters patent under which this right is granted and received and all of them are valid and effectual in law to secure the exclusive rights to which they purport to secure, and that each and every claim thereof is a good and valid claim, and that said inventors were the original and first inventors of the inventions described in the specifications and claimed in each claim thereof, it being further stipulated and agreed by the said Edw. S. Gaylord that neither he nor those holding under him will at any time contest the validity of said letters patent nor any of them nor their infringe-

ment thereof: Now, therefore, this agreement, made between Inter-
national Tooth Crown Company, party of the first part, and
16 the said Edw. S. Gaylord, party of the second part, witnesseth:
The said International Tooth Crown Company, for and in consideration of the sum of five hundred dollars and of the payment of the license fee hereinafter agreed to be paid and the faithful performance by the party of the second part of the conditions herein specified, doth hereby grant unto the party of the second part a right or privilege under said patents to use the said inventions for the production of artificial dentures in his own business as dentist and for his own patients only and for no other purpose, and to vend the artificial dentures so prepared to his own patients only within the said county of New Haven, State of Connecticut, and not elsewhere, during the time for which this right is granted, upon the following conditions: The said party of the second part shall keep full, true, and accurate books of account, furnished by the party of the first part, of every operation in dentistry in which any artificial crown or any series of artificial crowns are set upon or attached to roots or teeth in the mouth and of every operation or every piece of work substantially like those taught by or patented to the International Tooth Crown Company or its agents or assigned to it, as hereinbefore provided, and that he will enter or cause to be entered in said book the name of the patient, the date of the operation, the gross sum charged for said operation, and the gross sum received for said operation, and that he will on the first days of January, April,
July, and October of each year make to the party of the first
17 part a full, true, and accurate statement, under oath, if de-
sired, of all the sum or sums of money so received by him during the three months last preceding, and that he will within ten days thereafter pay to the party of the first part (10) ten per cent. of all the gross sum or sums of money so received by him. Said party of the second part further agrees that said books of account shall be open at all reasonable times to the inspection of the authorized agent of the party of the first part; that the said privilege shall not be assigned, sold, transferred, or otherwise disposed of in any manner.

That the party of the second part shall not, by himself, his agents or servants, directly or indirectly, use or practice said invention or vend said dentures for or to other dentists nor in any way except in his own business and for his own patients; and the said party of the second part agrees that in case he shall advertise said process or operations or dentures hereinbefore referred to, either in any publication or by notice or circulars or otherwise, he will not in said advertisement, notices, or circulars make any reference to or state directly or indirectly the price which he expects to receive for such work or his charges therefor. The said party of the second part further agrees that he will in no case and under any circumstances apply to a root or make for a patient a tooth crown like those patented or to be patented to the party of the first part or a series of tooth crowns at a less price than ten dollars for each crown so applied.

That the said party of the second part shall in no manner
18 countenance or encourage infringements on the letters patent or inventions above described or any of them, but shall at all times recognize the validity of said patents; that the party of the second part shall not knowingly admit as a partner or employee in his business as a dentist, directly or indirectly, any person or persons who stand enjoined from the use and practice of said inventions by the decree of any competent court, nor shall anything in this right contained be any protection or defense to the person or persons so enjoined; that the party of the second part, for and in consideration of the rights and privileges herein granted, hereby covenants and agrees to hold the within-granted rights and privileges subject to the terms and conditions herein specified, and that in case of failure on his part to comply with all or any of them, then this right shall be terminable at the election of the party of the first part and upon a written or printed notice thereof served upon the party of the second part or published in a paper having circulation in the county where the party of the second part resides or is doing business, the said party of the first part being the exclusive and final judge as to whether the party of the second part has violated this agreement; that this right shall continue in force until the 19th day of January, 1888, unless revoked by the party of the first part on account of violations of its provisions by the party of the second part, but such revocation shall not release or discharge the party of the second part from his covenants or from any amount due from him. It is further covenanted and agreed by the party of the
19 second part that upon the expiration of this right, whether by his own breach of covenants herein or by lapse of time, he will keep and observe every covenant, agreement, or stipulation herein in regard to the validity of said letters patent and all of them and the title thereto. It is further stipulated and agreed by the party of the second part that he will not teach or instruct any person whatever in the art of preparing artificial dentures as specified in said letters patent hereinbefore referred to or any of them unless said person shall first have obtained from International Tooth Crown Company a right or privilege in writing similar to that herein conveyed, and that he will not employ any person to perform the work or the operations or to make the dentures referred to in said letters patent or any of them unless said person shall first obtain from International Tooth Crown Company a right or privilege in writing similar to this agreement.

For the true and faithful performance of every covenant herein contained the said Edw. S. Gaylord, for himself, his heirs, executors, administrators, and assigns, does bind each and every one of them unto the said party of the first part and their successors and assigns in the sum of twenty-five hundred dollars of lawful money of the United States, liquidated and agreed damages. The party of the second part further covenants and agrees that in case of his violation of any of the clauses of this agreement and upon notice served upon him as provided in this agreement the party of the first part

may apply for and obtain from a suitable court an injunction
20 under said letters patent or any of them hereinbefore set
set forth, restraining the party of the second part from any infringement of said letters patent; and this agreement is to be taken as a *convent* that such injunction may forthwith issue; and the party of the second part agrees that he will not oppose the issuing of an injunction when applied for, as hereinbefore set forth. The International Tooth Crown Company, for and in consideration of the faithful performance of the covenants and agreements hereinbefore contained, agrees that it will protect the rights of the party of the second part herein so far as it may be reasonably able, and that it will endeavor, so far as possible, to maintain its monopoly under the letters patent hereinbefore set forth or any of them; and, further, that whenever said party of the second part shall furnish full and sufficient evidence and produce the affidavits of witnesses that any dentist in the city or town where the party of the second part resides is infringing said patent, then the said party of the first part shall commence proceedings against such infringing party, if he can be discovered, and prosecute the same in a reasonable manner and by all reasonable and proper means.

In witness whereof the parties hereunto have set their hands and affixed their seals this 27th day of February, 1883.

INTERNATIONAL TOOTH CROWN COMPANY,
By L. T. SHEFFIELD, *Treas.*
E. S. GAYLORD.

In presence of—
WM. A. LYON.

21 Circuit Court of the United States, District of Connecticut.

INTERNATIONAL TOOTH CROWN COMPANY
vs.
EDWARD S. GAYLORD and J. L. WILLIAMS.
} In Equity.

The Answer of Edward S. Gaylord and J. L. Williams to the Bill of Complaint of the International Tooth Crown Company.

The respondents, to so much of said bill of complaint as they are advised it is material they should reply to, answer and say, without waiving their right of exception to any errors and insufficiencies in said bill contained, with like effect as if the same were specially pleaded or advantage thereof taken by way of demurrer, that they admit that letters patent of the United States were issued to the Richmond Tooth Crown Company, as the assignee of Cassius M. Richmond, on the 22nd day of May, 1883, Nos. 277,941 and 277,943, for alleged new and useful artificial dentures, but as to the alleged transfer of title in said patents to the complainants the respondents have no information, and therefore leave the complainant to make such proof as it may be advised.

The respondents, further answering, say that said letters patent No. 277,941 are void and of no effect in law, because the said Cassius

M. Richmond was not the original and first inventor or discoverer of any material and substantial part of what is described and claimed therein, but that the same and every material and substantial part thereof had been previously invented by or known to the
22 following persons: T. S. Scranton, now residing in Madison,
Connecticut, at said Madison; J. J. Newman, now residing in Chicago, Illinois, at said Chicago; James Lewis Newman, Mrs. —— Gallagher, Mrs. —— Eldridge, and Frank Rockwell, all of Chicago, Illinois, at said Chicago, and Dr. Andrews, of Cold Water, Michigan, at said Cold Water, and at Chicago, Illinois, and at Kendellville, Indiana.

The respondents, further answering, say that said letters patent No. 277,943 are void and of no effect in law, because the said Cassius M. Richmond was not the original and first inventor or discoverer of any material or substantial part of what is described and claimed therein, but that the same and every material and substantial part thereof had been previously invented by or known to the following persons: William H. Dwinelle, Norman W. Kingsley, and Finlay Y. Clark, all now residing in the city of New York, State of New York, at said city of New York, and George W. Lawrence, now residing in Chicago, Illinois, at said Chicago.

The respondents, further answering, say that said letters patent Nos. 277,941 and 277,943 are void, because said alleged inventions therein described had been in public use and on sale in this country more than two years before said Cassius M. Richmond applied for a patent therefor, to wit, more than two years prior to December 1st, 1882, on or about which date the respondents allege that the said letters patent No. 277,941 were applied for, and more than two years before January 5, 1883, when the respondents allege that said patent No. 277,943 was applied for.

23 And the respondents, further answering, allege that said
letters patent No. 277,941 are invalid and void, because the alleged inventions and improvements therein described were abandoned to the public by C. M. Richmond, the alleged inventor thereof, prior to the application for a patent therefor.

And the respondents, further answering, say that said letters patent No. 277,941 are void, because at the time said C. M. Richmond devised and constructed the tooth crown described in said patent No. 277,941 there were in use and were described in prior publication- and patents tooth crowns of various constructions, which were so nearly like the tooth crown shown and described in said letters patent No. 277,941 that no invention was required to devise and construct the tooth crown claimed therein.

And the respondents, further answering, allege that said patent No. 277,941 is null and void, because the alleged inventions described therein were practiced within the United States more than two years before the application for a patent therefor, by and with the consent and knowledge of the said C. M. Richmond, by persons other than the said C. M. Richmond, to wit, by Edward S. Gaylord, of New Haven, at said New Haven; by Robert F. Burwell, of New Haven, at said New Haven; by George Edward Nettleton, of New Haven, at said New Haven; by Joseph H. Smith, of New Haven, at said New Haven, and by Austin B. Fuller, of New Haven, at said New Haven.

And your respondents, further answering, each for himself
24 admits that he signed a license, as alleged, in said bill, and like the licenses annexed thereto, but each denies that by said license he admitted the validity of the letters patent Nos. 277,941 and 277,943 in suit, and each denies that any convenant contained therein estops him from defending against either of said patents by setting up in answer and proof in this cause the invalidity of said patents.

And your respondents, further answerin-, deny, upon information and belief, that said patents, in manner and form as the same now appear in copies annexed to the bill of complaint, or either of them, were duly applied for at the time when the said license to J. L. Williams was signed or at the time when the said license to Edward S. Gaylord was signed.

And your respondents, further answering, allege that said licenses were procured to be signed by false representations, made at and before the respective dates of said licenses, by said Lucius T. Sheffield, named in said bill of complaint, to your respondents, to wit, by false representations as to the contents and provisions of said licenses and by false representations as to the existence of patents under which said Sheffield pretended to grant licenses to your respondents, which said patent did not exist, as said Sheffield well knew, and by fraudulent concealment by said Sheffield of facts amounting to a defense against the validity of said patents, in that said Sheffield fraudulently concealed from your respondents the fact that said Richmond had not made application for a patent covering the Richmond tooth crown until more than two years after the same had been in
25 public use and on sale in this country, though the date of said application for a patent covering the said Richmond tooth crown was well known to said Sheffield and was not and could not be known to your respondents except by the representations of said Sheffield.

And your respondents, further answering, allege that said Sheffield, well knowing that said application for a patent covering the Richmond tooth crown had not been applied for until more than two years after the same had been in public use and on sale in this country, and well knowing that your respondents did not know and and could not find out when said application was filed, and well knowing that your respondents had knowledge that said Richmond tooth crown had been in public use more than two years before the respective dates of said licenses, and with the intent to induce your respondents to believe that said application had been filed seasonably, suppressed his said knowledge that said public use was more than two years prior to the application for a patent for said Richmond tooth crown, and falsely and fraudulently and for the purpose of inducing your orators to believe that said application had been seasonably filed, represented to your respondents that said Richmond tooth crown was protected by patents already and theretofore issued.

And your respondents, further answering, allege that prior to the respective dates upon which the said licenses were signed they knew that the said Richmond tooth crown had been in public use 26 for more than two years, but that they did not know when the said patents had been applied for, and further allege that they knew said Sheffield to have charge of the patent affairs of the Richmond Tooth Crown Co. and verily believed, by reason of his representations as aforesaid, that patents had been seasonably applied for and had been theretofore granted and were then owned by the Richmond Tooth Crown Co., which covered the Richmond tooth crown.

And they allege that they and each of them signed said licenses in the full faith and belief, induced by said representations of said Sheffield, that said licenses were under patents covering the Richmond tooth crown and issued back of and before said licenses were signed.

And further allege that said Sheffield artfully worded the opening paragraph of said licenses so that your respondents might not discover the truth but might continue to believe that said Richmond tooth crown was covered by a patent or patents theretofore granted, and allege that said opening paragraph was intended and was understood to set forth and does set forth that Cassius M. Richmond had previously patented a tooth crown such as was then and at the time of signing said licenses constructed and as the respondents then desired to be licensed to construct it.

And your respondents, further answering, show that said tooth crown was not then patented, and said Sheffield well knew the same.

And your respondents deny that they or either of them ever paid any money or made any returns under said alleged contracts 27 or received any benefit whatever from the same, and aver that none of the covenants or agreements therein are binding on your respondents, but that the same were procured and induced by the false and fraudulent representations and concealments of said Sheffield, as aforesaid, and are utterly void and of no effect.

And the respondent J. L. Williams avers that he did not discover that said representations of said Sheffield were false and fraudulent until after his said alleged license was revoked by the complainant, to wit, on or about the 16th day of July, 1884, when the complainant served him with a notice of revocation, annexed to the answer and made part hereof, and he alleges that by reason of said revocation said covenants, if ever of any force, were then and there annulled.

And the respondent E. S. Gaylord avers that immediately upon his reading over the said alleged license and because of his discovery that some of the aforesaid representations of said Sheffield were false and fraudulent he repudiated the same and notified said Sheffield that he did not regard the same as binding. He admits that on or about the 16th day of July, 1884, his said alleged license was formally revoked by the complainant and avers that by reason of said revocation said covenants therein contained, if ever of any force, were then and there annulled.

And your respondents, further answering, allege that had they known at and before the respective dates of said alleged licenses that the application of said C. M. Richmond for a patent for the tooth crown constructed and applied as is shown in the patent No. 28 277,941, in suit, was not filed until December, 1882, they would not have signed said alleged licenses, because and each of them knew that said tooth crown so constructed had been in public use in this country more than two years prior to said date.

And they allege that the privilege of making and using Richmond's tooth crowns so constructed was a controlling inducement to their signing the said alleged licenses.

The respondents, further answering, upon information and belief deny that said patents in suit or either of them has been adjudged good and valid in law.

And the respondents, further answering, deny that the complainant is entitled to any relief in the premises, and pray to be hence dismissed with reasonable costs and damages in this behalf most wrongfully sustained.

EDWARD S. GAYLORD.
J. L. WILLIAMS.

District of Connecticut, } *ss:*
County of New Haven, }

On this 6th day of June, 1885, before me came Edward S. Gaylord and J. L. Williams, the within and above-named respondents, and being duly sworn, made oath that they had read the foregoing answer, and that the same is true of their own knowledge except as to the matters therein stated to be on information and belief, and as to those they believe them to be true.

[SEAL.] FRANCIS INGERSOLL,
Notary Public.

29 Sheffield Tooth Crown Co.

(Artificial teeth without plates.)

L. T. Sheffield, D. M. D., treasurer & manager.

26 West 32d Street,
New York, *July* 15, 1884.

Dr. J. L. Williams.

Sir: You will take notice that the license heretofore granted to you to make use of the patents of this company, together with all rights and privileges to you granted thereunder, is hereby, according to the terms of said license, terminated because of failure on your part to keep and comply with the terms and conditions in said license specified, such terms and conditions having been violated by you.

Yours resp'ct.,
INTERNATIONAL TOOTH CROWN CO.
L. T. SHEFFIELD, *Treas.*

30 Circuit Court of the United States, District of Connecticut.

INTERNATIONAL TOOTH CROWN COMPANY
ag'st } In Equity.
EDWARD S. GAYLORD and J. L. WILLIAMS.

The replication of The International Tooth Crown Company, complainant, to the answer of Edward S. Gaylord and J. L. Williams, defendants.

This repliant, saving and reserving unto itself now and at all times hereafter all and all manner of benefit and advantage of exception which may be had or taken to the manifold insufficiencies of the said answer, for replication thereto says that it will aver, maintain, and prove its said bill of complaint to be true, certain, and sufficient in law to be answered unto, and that the said answer of the said defendants is uncertain, untrue, and insufficient to be replied unto by this repliant; without this, that any other matter or thing whatsoever in the said answer contained material or effectual in the law to be replied unto and not herein and hereby well and sufficiently replied unto, confessed or avoided, traversed or denied, is true.

All which matters and things this repliant is and will be ready to aver, maintain, and prove as this honorable court shall direct, and humbly prays as in and by its said bill it has already prayed.

DICKERSON AND DICKERSON,
Complainant's Solicitors.

31 United States Circuit Court, District of Connecticut. In Equity.

INTERNATIONAL TOOTH CROWN COMPANY
vs.
EDWARD S. GAYLORD and J. L. WILLIAMS.

Whereas the defendants in the above causes are charged with a technical estoppel preventing them from contesting the validity of the patents by reason of certain licenses set forth in the bills of complaint; and

Whereas it is the desire of both parties to have a full and fair hearing upon the merits at the earliest possible day—

It is stipulated that defendants herein admit infringement of all the claims of letters patent of the United States to Cassius M. Richmond, May 22d, 1883, No. 277,941, and to Cassius M. Richmond, May 22d, 1883, No. 277,943.

It is further stipulated that all the exhibits hereinafter referred to are on file in the office of the clerk of the United States circuit court for the southern district of New York in the suit in said circuit and district of New York entitled International Tooth Crown Company *vs.* Cassius M. Richmond and Alvin S. Richmond and therein marked with the same designations as hereinafter.

It is further stipulated that the licenses referred to in the bill of complaint were duly cancelled prior to said infringements by defendants and to the commencement of this suit.

It is further stipulated that the complainant will and hereby does waive any estoppel against the defendants preventing them from contesting the validity of the letters patent here in controversy by reason of the licenses referred to in the bills of complaint herein or by reason of the fact that said Richmonds were assignors to the complainant herein of the letters patent referred to.

32 Dated January 25, 1886.

DICKERSON & DICKERSON,
Solicitors for Complainants.
JOHN K. BEACH,
Solicitor for the Defendants Gaylord & Williams.

United States Circuit Court, District of Connecticut. In Equity.

INTERNATIONAL TOOTH CROWN COMPANY
vs.
EDWARD S. GAYLORD and J. L. WILLIAMS.

Testimony for complainant on final hearing, taken before George H. Evans, special examiner (by consent), under rule 67, as amended, of the United States Supreme Court and pursuant to the annexed notice.

NEW YORK, *May* 24, 1884.

Present: Walter D. Edmonds, for complainant; S. J. Gordon, for defendants.

Certified copy of letters patent No. 277,941, May 22, 1883, to Cassius M. Richmond for improvement in artificial dentures.

Certified copy of letters patent No. 277,943, May 22, 1883, to Cassius M. Richmond for preparing roots of teeth for reception of artificial dentures, and requests the examiner to mark the same as Complainant's Exhibits Patents 1, 2, 4, and 5 of this date, respectively.

Counsel for complainant produces eleven original instruments of assignment, to wit:

No. 1. Instrument executed by Lucius T. Sheffield to the International Tooth Crown Company, dated June 23, 1883, conveying letters patent No. 277,933, recorded in the office of the Commissioner of Pattents December 20, 1883, in Liber V 30, page 247.

33 No. 2. Instrument of assignment and agreement executed by Richmond Tooth Crown Company to Washington W. Sheffield and Lucius T. Sheffield, conveying letters patent Nos. 277,941 and 277,943, and other patents, dated June 23, 1883, and recorded in the office of the Commissioner of Patents, in Liber K 31, page 16.

No. 4. Instrument of assignment and agreement executed by Washington W. Sheffield and Lucius T. Sheffield to International Tooth Crown Company, conveying letters patent Nos. 277,941 and 277,943, dated June 23, 1883, and recorded in the office of the Commissioner of Patents January 18, 1884, in Liber K 31, page 19.

No. 5. Instrument of assignment of invention before patent granted, executed by Cassius M. Richmond to the Richmond Tooth Crown Company, dated October 16, 1882, recorded in office of Commissioner of Patents February 13, 1883, in Liber M 29, page 192, conveying invention for which letters patent No. 277,941 were afterwards issued.

No. 6. Instrument of assignment of invention before patent granted, executed by Cassius M. Richmond to the Richmond Tooth Crown Company, dated January 20, 1883, recorded in office of Commissioner of Patents January 24, 1883, in Liber N 28, page 355, conveying invention for which letters patent No. 277,943 were afterwards granted.

No. 9. Instrument of agreement and assignment executed by Richmond Tooth Crown Company and Washington W. Sheffield and Lacius T. Sheffield, dated February 3, 1883, and conveying to said Sheffield said inventions before patents therefor were granted.

No. 10. Instrument of agreement and assignment executed by Washington W. Sheffield and Lucius T. Sheffield and International Tooth Crown Company, dated February 19, 1883, and conveying to said company all said inventions before patents therefor were granted.

Counsel for defendants consents that for purposes of convenience copies of said instruments, uncertified, may be marked as exhibits in evidence herein on the part of complainants, and with the same force and effect as though certified copies of said instruments had been produced and marked.

Counsel for complainants offers in evidence copies of said instruments and requests the examiner to mark the same Complainant's Exhibits Assignments Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, and 11 of this date respectively, and they are so marked.

It is stipulated that the assignments, licenses, or agreements heretofore offered in evidence were duly executed by the signers thereof upon the dates thereto affixed.

34 Counsel for complainant offers in evidenee exhibits marked "Prenot Teeth," "Prenot Mouth," and "Base for Supporting Prenot Teeth." It is stipulated on the part of defendants that the said operation marked "Prenot Teeth" was performed by the defendants jointly subsequent to the cancellation of the license to them and prior to the commencement of the present suit and subsequent to May, 1883, and that said operation was duly attached by cement in the mouth of the patient, which mouth is substantially represented on "Exhibit Base for Supporting Prenot Teeth."

Complainant rests.

United States Circuit Court, District of Connecticut. In Equity.

THE INTERNATIONAL TOOTH CROWN COMPANY
vs.
EDW'D S. GAYLORD *et al.*

Testimony for complainant on final hearing, in rebuttal, taken before George H. Evans, notary public, special examiner, under rule 67 of the U. S. Supreme Court as amended.

NEW YORK, *April* 21, 1886.

Present: Walter D. Edmonds, Esq., on behalf of the complainant, and S. J. Gordon, on behalf of the defendants.

LUCIUS T. SHEFFIELD, a witness called on behalf of the complainant in rebuttal, examined by Mr. EDMUNDS, testifies:

Q. 1. What is your name, residence and occupation, and age?

A. Lucius T. Sheffield; age, 32; born in 1854; residence, 26 West Thirty-second street, New York city; occupation, a dentist.

Q. 2. Are you a graduate of any dental college? And, if so, please state which.

A. I am a graduate of Harvard Dental School, Boston, Massachusetts.

Q. 3. How long have you actually practiced dentistry?

A. Since 1870.

35 Q. 4. Are you connected in any way with the complainant in this suit?

A. I am the treasurer and secretary of the International Tooth Crown Company.

Q. —. Are you acquainted with Cassius M. Richmond, grantee of letters patent No. 277,941, herein sued on?

A. I am.

Q. 6. State the circumstances of your acquaintance with him, beginning with the commencement thereof, so far as the same affect the said letters patent here in suit.

A. The first time I met Cassius M. Richmond was at a meeting of the Odontological Society, in the latter part of 1880 or the first part of 1881. A few days afterwards he called upon me at my office, No 3 West Thirtieth street, in the city of New York, and showed me his invention of a tooth crown. I was very much pleased with it the principle of the invention being absolutely new to me, and I immediately began negotiations for the purchase of an interest in the invention. I ascertained from C. M. Richmond that he would sell a half interest in his invention for the sum of five thousand dollars. Before consummating an arrangement with C. M. Richmond I submitted C. M. Richmond's proposition to sell a one-half interest in his invention for five thousand dollars to my father, Washington W. Sheffield, and at the same time showed to him models representing the invention. My father discouraged the payment of so large a sum for an uncertainty, and said that in his practice he did not have opportunity to put on five such crowns in a year, but by persuasion and argument I induced him to consent to the purchase, and very shortly thereafter made the following arrangement with C. M. Richmond, viz: I agreed to pay twenty-five hundred dollars in cash, which was paid, and he agreed to accept twenty-five hundred dollars when it should be earned by me in the business. This latter two thousand five hundred dollars was earned and paid to C. M. Richmond very shortly after we went into business. In May, 1881, I hired the house which I now live in, and our business began—that is, the business of producing tooth crowns after C. M. Richmond's invention. During the summer of 1881 C. M. Richmond and myself practiced this invention in the office of my father, at New London, Connecticut. While we were in New London it was ascertained through the failure of several crowns to hold their position upon the roots to which they were attached that they were defective in that they were open at the end of the cap enclosing the end of the root at the point where the porcelain came in contact with the cap, leaving the cement which attached the crown to the root exposed to the influences of the secretions of the mouth and the fluids filled with decomposed matter, which is taken into the mouth, through this space between the porcelain and the band. We also ascertained at this time that the principal 36 weakness of the crown made with the open front end was that the only strength of attachment to counteract inward pressure, brought upon the face of the tooth, was in the attachment of the pin, as the band with no strongly soldered head across it had not sufficient strength to withstand such pressure, and the band, in some instances, was separated from the crown, and frequently in the subsequent operations where the band had been fitted it was bent out of its proper shape by contact with tools, causing loss of time and annoyance. To obviate this C. M. Richmond set himself to work and produced an invention, the original of which is presented here and marked "Exhibit Richmond Sheffield Operation." After this invention was made the operations were usually made in this manner. When the summer work was ended at New London or some time during the latter part of the summer it was agreed upon by my father (who had become convinced of the value of the invention) and myself and C. M. Richmond that my father should become equally interested with us in this invention. Whereupon he agreed to pay five thousand dollars for a one-third interest, and shortly thereafter the half of the one-third interest, viz., twenty-five hundred dollars, the whole one-third interest being five thousand dollars, was paid to C. M. Richmond by my father, our valuation of our interest being as follows: I paid C. M. Richmond five thousand dollars for a one-half interest, he holding the other one-half interest, making our whole valuation at that time of the invention ten thousand dollars. When we concluded to take my father into a third interest in this invention we placed the valuation at fifteen thousand dollars, making the value of the one-third interest that he bought five thousand dollars. We returned to New York and continued the practice of this invention at 26 West Thirty-second street. Our practice increased very largely, and improvements in this invention were made step by step by C. M. Richmond; notably an improvement in the

operation was made, I think, in the early part of 1882 in the mouth of Mr. Saffold, of San Francisco, California. Mr. Saffold had had four front crowns made by C. M. Richmond in San Francisco some time previously. The bands of these crowns had not been made to be hidden beneath the gum. They were made upon their open upper surface with a horizontal line, instead of being made with depressions cut out at each side, in conformity with the point of the alveolar process between the teeth, and therefore making it impossible to hide them beneath the gums. It is unnecessary to say that these bands were very objectionable, presenting in the mouth large bands of gold above the porcelain. C. M. Richmond removed these crowns of Mr. Saffold, and, making new crowns, cut the sides of the bands to conform to the points of the alveolar process between the teeth, and bevelled the front lower end of the band in such manner as to allow the band to be completely hidden by the gum upon its front surface and to allow the upper edge of the porcelain to come
37 into contact with the gum. Another notable improvement in the crown was the using of a square wire instead of the tubular one, the square wire preventing rotation of the tooth. C. M. Richmond was making inventions, continually improving the methods of the production, and shortening the time of production, by this means aiding the dentist and saving the patient loss of time. When these inventions were sufficiently perfected, which was about the latter part of 1882, it was determined to take out letters patent for the United States and for foreign countries, and the same was accordingly done, some seven or eight patents being taken out for the United States, so as to cover the invention and all of its improvements, among which was the letters patent No. 277,941, herein sued on. These inventions were assigned to me by C. M. Richmond, or rather to my company, which had previously been formed, and which consisted only of my father and myself, being the old Richmond Tooth Crown Company, I agreeing to pay all the expenses for taking out the patents. For these inventions I agreed to pay C. M. Richmond the sum of ten thousand dollars in addition to what had already been paid for the invention in its crude state. Two thousand dollars of this sum of ten thousand dollars was paid in cash, as agreed, and four thousand dollars by check some months afterwards, and for the remaining four thousand dollars C. M. Richmond accepted eight thousand dollars of the capital stock of the International Tooth Crown Company, which was the company then formed to hold the title to the American and foreign patents and to manufacture such incidental instruments and supplies as might be involved in their use. That company is the complainant here today and issued all its stock for said patents, the Richmond Tooth Crown Company having reconveyed its interest in the invention to my father and myself and we having conveyed them directly to the International Tooth Crown Company in return for its stock. My father and myself, therefore, paid to Cassius M. Richmond for these inventions in the aggregate twenty-one thousand five hundred dollars, of which eight thousand dollars was stock of the International Tooth Crown Company. About the latter part of 1882, the firm

having been dissolved and the Richmond Tooth Crown Company been incorporated and taken its place, C. M. Richmond for some time thereafter occupied the position of operator and then, dissolving the relation entirely, he took from complainant a license under its letters patent and established a private practice in the city of New York, associated with his brother, A. S. Richmond. For some reason, becoming dissatisfied with the way business went on and believing that the Richmond Tooth Crown Company was taking business away from him, he, when requested to pay his license fee, absolutely refused to do so and the present suit was the result, and also the result or cause of the numerous licensees of the International Tooth Crown Company stopping their license fees until this suit could be decided, thereby causing the complainant 38 incalculable loss, the company having between two and three hundred licensees, most of whom have entirely ceased to pay license fees, especially those who are doing the largest amount of the work.

Q. 7. What was the first time that Cassius M. Richmond completely closed the cap over one of his crowns?

A. The first cap that he ever closed was one that was made in my father's office in New London. The identical tooth is here, and marked "Exhibit Richmond Sheffield Operation." This tooth was made in the summer of 1881.

Q. 8. What, in your opinion, was the effect of such closing on the invention?

A. The operation, as C. M. Richmond was performing it at the time that he went to New London, seemed to be much more permanent than it afterwards proved, the fact being that, although in some cases it might last a period of four or five or even more years, there are many mouths in which it would not last more than six months. It was brought very apparently to our minds by the accident to the crown made for Mrs. Alden Hewitt, as well as other cases, and C. M. Richmond immediately proposed the operation shown in "Exhibit Richmond Sheffield Operation" herein. This operation has been made with a closed cap ever since the invention was made by C. M. Richmond in every case in my office, unless the operation was made against my orders and contrary to my wishes. I consider this operation as perfection compared with the invention which I originally purchased from C. M. Richmond, the closing of the end of the cap immensely increasing its strength, power of protection against splitting the root, which might occur from the leverage brought to bear by the pin within the root when lateral pressure was brought to bear against the tooth, and protecting the end of the tooth as well as the attaching cement from the dissolving effect of the fluids of the mouth, and by these means producing the most permanent structure ever invented as a substitute for a tooth crown.

NEW YORK, *April* 22, 1886.

Present: Walter D. Edmonds, Esq., on behalf of the complainant, and Solomon J. Gordon, Esq., on behalf of the defendants.

Direct examination of LUCIUS T. SHEFFIELD resumed:

Q. 9. You have alluded to the fact that after Cassius M. Rich-
mond left the employ of the Richmond Tooth Crown Company, in
the fore part of 1882, and established an independent practice, asso-
ciated with his brother, A. S. Richmond, that he was "dissatisfied
with the way the business was conducted;" what business do
39 you refer to? And please state as fully as you can what was
the situation between your company and the Richmonds at
and after the time referred to.

A. I mean that shortly after Dr. C. M. Richmond left the employ of my company and started in business for himself he imagined that the company were keeping from him certain patients that he thought were his own, as he alleged that they had been recommended to him personally and had been retained by the company. Becoming incensed at this imaginary wrong he threatened to distribute circulars on the street in front of my house and to put "a banner" on the street advertising his removal. He carried this threat into effect soon after—this was about August, 1883—and had a boy on the street in front of my company's place of businsss, No. 26 West Thirty-second street, who distributed to all passers-by a circular, a specimen of which I here offer.

(Same is marked "Complainant's Exhibit Richmond Circular No. 1.")

It was about the same time or slightly before that the Richmonds had refused to pay the license fee, Alvan S. Richmond having, as well as his brother, C. M. Richmond, taken one of the regular licenses of the company. Accordingly, revocation of their licenses had been served on them, and I met the street circular by the two circulars which I now offer, and which I caused to be distributed on the street and to Richmonds' patients.

(Said circulars are marked as Exhibits "Richmond Company's Circulars Nos. 1 and 2" respectively.)

Richmond then published and distributed a counter-circular, which I also offer.

(Same is marked "Exhibit Richmond Circular No. 2.")

These circulars indicate somewhat the very unpleasant state of feeling at that time existing on the part of the Richmonds towards my company, and from this period dates the first suggestion of the Richmonds that their patents were not perfectly valid. I offer two letters written to me on August 23, 1883, by Cassius M. Richmond.

(Said letters are marked Complainant's Exhibits Richmond Letters Nos. 1 and 2 respectively.)

And I also offer in evidence a letter dated September 10, 1883, and written by the defendant A. S. Richmond to Dr. V. M. Smith, of Syracuse, New York, who sent it to me. I am familiar with the handwriting of both the Richmonds, and I have seen them sign their names very often, and I therefore can and do identify these letters.

(The letter last referred to is marked in evidence Complainant's Exhibit Richmond Letter No. 3.)

40 Q. 10. Are you acquainted with the inventions covered by the letters patent here in suit—I refer particularly to C. M. Richmond crown patent No. 277,941—and, if so, state, if you please, what is your opinion as to the value and advantage of said inventions compared with systems of artificial dentures known prior thereto, and give your reasons for any opinion that you may express?

A. I don't know that it is necessary for me to add anything on this point to what has already been testified to by my father, Washington W. Sheffield, and Dr. H. A. Parr, which I understand and endorse fully. My opinion unqualifiedly is that it is the greatest invention known to the art of dentistry. I speak of the invention of C. M. Richmond as finally perfected and specified in the patent referred to. The improvement in this system of crowning or bridging teeth over all other methods of supplying substitutes for lost teeth consists in its permanency, solidity, cleanliness, and beauty. It is permanent because there are encircling ferrules around the necks of the teeth, having a plate of gold soldered across their ends, producing inclosing caps which, when cemented fast to the roots or teeth, prevent the ingress of any fluids which might either cause decay or dissolution of the attaching cement. The ferrule, embracing, as it does, the entire end of the root, prevents any possible fracture from lateral pressure that might be brought to bear upon the crown. The possible dissolution of cement by the action of any fluids which might attack it at the edge of the band where it comes in contact with the side of the root is prevented by the gum under which the end of the band protrudes forming, as it were, a perfect valve or stopper to the ingress of any deleterious dissolving fluid.

This operation is more solid than any other formerly known for this reason, that being fixed rigidly by means of this inclosing cap or ferrule and the cement, no movement of the crown upon the root can possibly take place.

These new operations here in suit are cleanly—indeed, more cleanly than the natural teeth even, because the caps incasing the roots exclude all possible deposits of food which might decompose and become filthy.

The former systems presented none of the advantages enumerated.

Q. 11. State, if you can, from your practical experience what has been the result of the inventions here in suit, so far as the public and the profession are concerned.

A. The effect has been that it has increased the practice and income of those who have learned to do the work, and this increase has been the result of the great demand on the part of the public for the improved method of applying artificial teeth.

41 In my own practice, by which I mean the practice of the

Sheffield Tooth Crown Company, it has been the means of bringing in a large income.

Q. 12. You were present, were you not, during the taking of testimony in this cause in Philadelphia last week, where a Dr. Stellwagen was examined, and you observed the operation then shown in his mouth?

A. I was and I did.

Q. 13. Please describe the condition of that operation so far as the cement was concerned.

A. In the first place, the crowns were Beer's gold crowns, and were made, as all operations were made in those days, in fact, with a hole purposely drilled through their end to allow the egress of superfluous cement used in attaching the crown to the tooth or root. There were two of these crowns in Dr. Stellwagen's mouth, side by side. I think two bicuspids. the holes were about $\frac{1}{32}$ of an inch in diameter, and the cement had dissolved out of these holes, I should think, sufficiently to leave the end of the teeth entirely uncovered within the ends of the caps.

Cross-examination by S. J. Gordon, Esq.:

Cross-Q. 16. I observe that in your answer to the 6th direct question you speak of the Cassius M. Richmond invention of a tooth crown shown you in the latter part of 1880 or the first part of 1881, in New York city, which pleased you, and in which you saw, as you thought, a new principle. Your language is, "principle of the invention." State, if you please, what that principle, new to you, consisted in.

A. The banding or ferruling the exposed end of the root of a tooth circumferentially.

Cross-Q. 17. What evidence, if any, did he then or about that time give you of the practical application of such, as you regarded it, improved tooth-crown work in his own experience or that of those whom he had interested in it?

A. He showed me the operation in his own mouth and models upon the roots of teeth which he carried in his pocket.

Cross-Q. 18. When were you given to understand that the operation in his own mouth was made?

A. I think he stated a year or two before. I do not remember exactly.

Cross-Q. 19. State, as near as you can, the date when you last saw that operation in Dr. Cassius M. Richmond's mouth or knew of its still being there.

A. It was removed some time in 1882 and replaced by another operation.

Cross-Q. 20. What did he show you by way of letters and testimonials from dentists in various parts of the country as to their knowledge of the practical application of such tooth-crown work by Dr. Richmond or others?

A. I saw some letters and had them in my possession in my safe.

I never particularly read them. I read a few of them to see
42 the general purport. I understood these letters to have been
written by dentists. I do not remember that the po-celain-faced tooth crown was mentioned in any of them, but I do distinctly remember one or more of them mentioning Dr. Richmond's gold crown and of its excellence, as Dr. Richmond assumed the invention of this gold crown, which he also demonstrated.

Cross-Q. 21. The crown in Dr. Richmond's mouth, to which you have referred, was a porcelain front, was it not?

A. It was.

Cross-Q. 22. Name the different kinds of cement known to you which may be used in dentistry which set so hard as to be impervious to air and water.

A. Oxy-phosphate of zinc, which is used at present, and oxy-chloride of zinc, which was used formerly, and an amalgam composed of mercury and other metals, which perhaps might be called a cement.

Cross-Q. 23. How long has the oxy-phosphate of zinc been known?

A. I don't know.

Cross-Q. 24. How long have you known it?

A. Four years as such.

Cross-Q. 25. How long have you known the oxy-chloride of zinc?

A. Ever since I have been a dentist.

Cross-Q. 26. What are the advantages of one over the other?

A. The oxy-chloride is more irritating than oxy-phosphate. Oxy-phosphate is therefore more generally used, and as it sets equally hard as the oxy-chloride it is preferable.

Cross-Q. 27. Please look at "Complainant's Exhibit Prenot Teeth" and say whether or not you find any vent holes therein?

A. What do you mean by vent holes?

Cross-Q. 28. Perhaps the term vent holes is improperly used, but I meant thereby holes for the escape of superfluous cement?

A. I find no vent holes made purposely to allow the escape of superfluous cement.

Cross-Q. 29. But you do find holes which would serve that purpurpose, do you not?

A. I find holes or crevices which were not perfectly stopped when this operation was resoldered after having been cut out of the mouth, such resoldering having been done simply to hold the cut edges of the bands together.

Cross-Q. 30. There would be the same occasion, would there not, for provision for superfluous cement in the one case as in the other in securing the cups of the Prenot Teeth Exhibit and of the Philadelphia example, testified to by Dr. Stillwagen?

A. There never was any necessity for such provision. The best evidence of perfect cementing of a tooth crown to a root is that all the superfluous cement is forced over the edge of the band, thus making it sure that the cement envelopes the root and lines the cap throughout.

Cross-Q. 31. You say, then, do you, that in the Prenot Teeth Exhibit there are no holes purposely drilled through or made to allow the egress of superfluous cement used in attaching the crowns to the teeth or roots?

43 A. There are none for such purpose; there never were any for such purpose. There are three specific openings, two of which go entirely through the metal of the two Beers' crowns that were split open to take the case off, and one hole in a partial Richmond porcelain-faced tooth crown, which does not pass through the gold at present. This hole was drilled by myself at the time of taking off the case in search of a possible pin, which I expected to find at this point, or in the place where the pin actually was, as I can't state whether there was actually one in it at that time. The hole was drilled for the purpose of cutting off the pin to take the case out. It was afterwards soldered up by myself or one of my men.

Cross-Q. 32. The two examples of crown work, Prenot and Stillwagen, were the work of the same man, as I understand it, were they not?

A. I don't know.

Redirect by Mr. EDMONDS:

Q. 33. Will you please look at the two papers or documents handed to you and state to me what they are?

A. They are two licenses issued to E. S. Gaylord, of New Haven, Connecticut—one by the International Tooth Crown Company and one by the Richmond Tooth Crown Company—and executed, the former on the 28th day of February, 1883, and the latter executed on the 19th day of January, 1883.

Q. 34. Have you seen Dr. E. S. Gaylord sign his name, and can you testify that the signature E. S. Gaylord affixed to said licenses is his signature?

A. I can and I have and do. I saw these specific signatures as they were made, as they were made in my presence, which here appear upon these licenses.

(The licenses referred to are offered in evidence and marked respectively "Complainant's Exhibit Gaylord License Nos. 2 and 1.")

(Defendants' counsel objects to the introduction of the licenses as repugnant to the stipulation under which these causes are to be heard.

Redirect examination of LUCIUS J. SHEFFIELD continued:

Redirect Q. 35. Dr. Cassius M. Richmond has sworn on his direct examination, concerning the invention described in letters patent 277,943, here in suit, that the invention therein described was first shown to him by Dr. Geo. W. Lawrence, and that he told you, Dr. L. T. Sheffield, the source from which he obtained the information concerning said invention before you applied for the patent. Is it or not true that Dr. C. M. Richmond, or any one else, ever told you anything of the kind?

A. Dr. C. M. Richmond never told me anything of the kind, or any one else, previous to the taking out of the patent.

44 Redirect Q. 36. Or previous to the trouble that you had with him in 1883 and concerning which you have testified?

A. No; on the contrary, the necessity which made this invention was one that presented itself continually to us, and when he had made the invention he used it as one of the greatest advertisements that he had to induce people to have the operation of cutting off the teeth performed, it seeming to be in the minds of the patients the severest part of our operation—that is, the cutting of the tooth and taking out of the nerve. Immediately after this invention was made by Dr. Richmond we inserted in all of our advertisements a statement that the operation was painless.

Redirect Q. 37. Is it or not true that Dr. C. M. Richmond or any one else ever informed you in any way that his tooth-crown operation, as finally perfected and patented in letters patent No. 277,941, had ever been in use for more than two years before the date of that patent?

A. As I understand this patent, he never made any such statement in regard to it. I am positive that the subject of this patent was never mentioned.

Redirect Q. 38. But is it not, on the contrary, the fact that Dr. C. M. Richmond stated to you that the subject-matter covered by that patent had been regarded by him as experimental up to the date of its completion in New London?

(Objected to as leading and incompetent.)

A. The portion of this patent which was represented to me by Dr. Richmond—shown to me in models—was a partial result of his experiments, of which the patent was the culmination, and he stated to me that he had in several instances removed cases representing this partial modification of this patent for the purpose of ascertaining the condition of the operation after having been worn some time, considering it experimental, and removing the case or operation for the purpose of ascertaining any defect which might be overcome or improved by further invention.

Redirect Q. 39. How long did he continue these observations and experiments concerning the operation prior to the date of the letters patent application, in December, 1882.

A. Continuously.

Redirect Q. 40. Reference has been made in the testimony to the removing by C. M. Richmond of an operation in the mouth of a Judge Saffold and to his improving the same before restoring it after such removal. Can you fix the date approximately of this change in the Saffold operation?

A. I can fix it by referring to a paper which has been drawn up as memorandum from my books.

Redirect Q. 41. Where was that operation removed?

45 A. The operation was removed at 26 West Thirty-second street after May, 1881.

Redirect Q. 42. How do you know that?

A. It was removed by Dr. C. M. Richmond after we became partners, and we became partners in April, 1881, and took the lease of those premises May 1, 1881.

Recross-examination by Mr. GORDON:

Recross-Q. 43. When the operation was removed from Judge Saffold's mouth at your office, or about then, what was told you as to the time of its insertion in the place—where and by whom it was done?

A. It was inserted some time in the latter part of 1878, or some time in 1879, as told me by Dr. C. M. Richmond, and the operation had been made in San Francisco, all of which was told me by Dr. C. M. Richmond.

Recross-Q. 44. Was that operation repaired and returned to his mouth in whole or in part, or was a new operation made for Judge Saffold?

A. A new operation entire was made for Judge Saffold.

Recross-Q. 45. How long did the removed operation remain in your office?

A. For some time; possibly six months. I think it was taken away by Dr. A. S. Richmond.

Re-redirect:

Re-redirect Q. 46. What is the fact as to the imperviousness of the oxychloride of zinc cement to the fluids of the mouth; is that cement in fact impervious or is it soluble under the action of the fluids of the mouth?

A. It is not impervious, and it is soluble under the action of the fluids of the mouth.

Signature waived.

NEW YORK, *April* 21, 1886.

Present: Walter D. Edmuuds, Esq., on behalf the complainant, and S. J. Gordon, Esq., on behalf of the defendant.

WASHINGTON W. SHEFFIELD, a witness called on behalf of the complainant in rebuttal, having been duly sworn, testifies as follows in response to questions by Mr. EDMUNDS:

Q. 1. What is your name, age, and occupation and residence?

A. Washington W. Sheffield; 69 years of age; born April 23, 1827; dentist by occupation; residence, New London, Conn.

46 Q. 2. Are you acquainted with Cassius M. Richmond?

A. I am.

Q. 3. State, if you please, the circumstances under which you first became acquainted with him.

A. My son brought him up to my house, in New London, to spend the Sabbath the first time I ever saw him.

Q. 4. When was that?

A. Early in 1881, in the winter time.

Q. 5. What was the occasion of his visit?

A. He came to show me his invention of the crown to convince me of its usefulness.

Q. 6. What did he show you?

A. He showed me porcelain crowns and gold crowns at the time; he had quite a number with him.

Q. 7. What, if any, was his relation to your son at that time?

A. Nothing more than he was a neighbor in Thirtieth street, and my son had been very much taken with the crown.

Q. 8. What, if any, became his relation with your son subsequently?

A. He became his partner in dental practice in the city of New York shortly after.

Q. 9. What further intercourse, if any, did you have with C. M. Richmond after that?

A. Early in July he came up to help me through my summer's work at New London. He remained there from the early part of July until the first days of September.

Q. 10. Describe the tooth crown which Richmond showed you on his first visit to your place concerning which you have testified.

A. The first method of making a crown he showed me was to prepare the root, bevelling up even with the gum, inserting onto the root a ferrule or band which was bevelled on the front, a hole drilled into the root of the tooth, pin inserted into the opening, then taking a wax impression of it and the adjoining teeth. Sometimes the wax would remove pin and band on withdrawal of the impression. When it did not the band and pin were carefully removed and placed back into the wax; then a plaster cast was poured into the impression of the band and adjoining teeth; then adjust the porcelain to the band in relative position with the adjoining natural teeth. When accomplished the plaster cast was cut away and the porcelain and band invested for soldering; and this is the thing shown by this model ready for soldering.

(The model is marked in evidence "Exhibit Richmond Early Operation in Investment.")

After the wax was removed a floor was formed of platina or gold plate or gold foil to fit inside and below the edge of the band as a floor for solder. The piece was then heated up and solder flown around the pin and porcelain, making the three pieces one. When the finished crown was removed from the investment and finished up it presented the appearance of "Exhibit Richmond Old
47 Operation," only at times the piece fitted around as a floor for the solder would extend under the porcelain somewhat.

Q. 11. What was your opinion of the crown operation which you have described?

A. I always had doubts about the strength of the outside band, it being of necessity so narrow, and about the operations leaking. The bands or ferrules frequently, in finishing a piece, would bend and get out of position, because of their thinness and having no support on the under side—that is to say, the band was free, or nearly so, from the back side of the porcelain around on the front side; nothing to support it but the porcelain. There was no closed joint, but simply the porcelain resting against the edge of the band,

and that was the objection I made in the first place about the permanency of the operation.

Q. 12. Is the operation which you have described the only operation shown to you by C. M. Richmond at the times mentioned; and, if not, will you please describe any other or subsequent operations which he showed to you and the circumstances under which the same was produced?

A. Soon after my son became a partner of his, which was in April, 1881, I came down to New York, and the operation then was somewhat different. The root was prepared the same and an impression taken of the root, a band or ferrule fitted to the cast of that impression and then to the root and soldered together. Then to the back side bevelled half of the bottom of the band was soldered a piece of platina or gold, a notch cut in the front side of it, ground off in a line with the bevel of the band, placed upon the root, a porcelain ground to fit the band in the mouth, removed and waxed to the band and back closure or floor, placed again onto the root and carefully adjusted in relative position to the other teeth, then removed, pin inserted through the notch into the wax below, invested in solder, making the same exhibit referred to in describing the first operation, viz., "Exhibit Richmond Old Operation," and the same as the first operation. The next operation to obviate the difficulty I apprehended, and the experience we had with a patient, Mrs. Alden Hewitt, of the dissolving of the cement by leakage around the band, he produced in the next room to me, but I did not see him do it, "Exhibit Richmond Sheffield Operation," as shown in the exhibit of that name herein. That exhibit is the actual identical tooth made at that time by Dr. C. M. Richmond. It differs from the operations I have described by having a full closed cap over the front and back bevels of the band. This obviated the disadvantages I have alluded to by strengthening the band and preventing the possibility of leakage of the secretions of the mouth to dissolve the cement. That exhibit was made late in August or the first of September, 1881, shortly after the operation in Mrs. Alden Hewitt's mouth.

48 Q. 13. Your opportunities for observing the operations of Dr. C. M. Richmond in crown work during the years 1881, 1882 were considerable, were they?

A. Unlimited, almost.

Q. 14. And what, if anything, did you observe during that period as to the condition or development, if any, of the operation of crown work as made by him?

A. Closed caps were almost invariably made after that, and it became to be a fixed fact that it was the only proper way to make them sufficiently strong and to prevent leakage.

—. — the tooth-crown invention of Dr. C. M. Richmond, for which letters patent here in suit have been granted to him?

A. I am.

Q. 16. State, if you please, and as fully as you can, what, in your opinion as a practical dentist, are the advantages, if any, possessed by the said inventions over former methods of inserting artificial teeth, and give any reasons for your opinion which you may have.

A. There is no comparison between these perfected inventions and any methods known to the profession previously. In the case of a tooth presented to us so broken down that filling would no longer preserve it, the early method was to break away the remaining fragments of the tooth, file it down level with the gum, carve a piece of ivory, or by taking a calf's tooth, cutting it off, drilling a hole that when fitted would come opposite a hole previously made in the root, inserting a piece of wood into the tooth thus made or prepared, the upper end of which was inserted into the root, forming a dowel to hold the tooth in position, it being impossible to fit the end of the ivory or calf's tooth so closely to the end of the root that particles of food and saliver would not work between them, making a very filthy condition of things, causing the ultimate decay of the root, which frequently, by thus being weakened, would split in the act of mastication, and certainly would be funnelled out by decay, so as not to hold the dowel, which resulted in the loss of the root. The next step was a porcelain tooth, with a hole in the centre, inserted in the same manner as last described, with the same disadvantages of filthiness of the above-described operation, by the wood becoming saturated and decay ensuing. The next step was a thin porcelain backed with platina, with a metal pin inserted into the root and removed by an impression, invested and soldered, making a pivot tooth with a metal pin, the disadvantages of which was the same as the above in not sealing the root from the action of the secretions of the
49 mouth, thus ultimately causing decay of the root. The teeth are the first organs of digestion. Food improperly prepared, introduced into the stomach, is almost a certain cause of indigestion and dyspepsia, and the nearer we can approach perfect natural teeth the more complete and perfect will be the mastication obtained; and with my experience, which has been very large with the perfected inventions of the crown, we have an instrument that is fully equal for all the purposes for which natural teeth were made. A comparison of this operation and any other known method of supplying the loss of the natural teeth is only like a comparison between a wooden leg and a healthy, sound, natural leg. In the first place, it is a clean, sweet operation, or may be kept so, when properly adjusted, with one-half the labor of cleaning which ought to be bestowed upon the natural teeth. In the next place, it is not an artificial operation in the sense that it may be removed from the parts. I would further say that the roots above mentioned, when crowned for single crowns or by the perfected inventions, are absolutely sealed and protected from the action of the secretions of the mouth which produce in the case of the old pivot tooth sure decay and loss of the root. I may, therefore, say that in comparing all other crowns or systems known to the dental profession prior to the time the inventions here in suit were perfected, which perfection means a perfect adaptation of the band to the root with a

perfect closure without any aperture whatever for the leakage of the secretions of the mouth into the inner portion of the crown dissolving the cement and decaying the root. I may justly say that no denture or system of dentures was known which could permanently preserve and render serviceable the remnants of decayed or broken-down teeth, and, indeed, in some respects acting with better results than any natural tooth exposed to the same influence. Therefore I consider the inventions here in suit of the greatest possible utility and advantage to the human race, and the opinions I have expressed are not merely theoretic, but such as I have gathered from practical experience in the daily practice of my profession for a period of over thirty-four years, and my opinions as to the advantages of these inventions sued on are the result of the practical experience of thousands of my own patients whose broken-down teeth have been saved by me through the actual application by myself of these inventions, and whose cases and their continuing condition is open to my inspection and could be verified by the actual cases themselves to any desired extent. These inventions have passed, I may say, the period of experiment and theory and are now recognized as practical systems of dental operation of the highest value, and this not only by myself, but by thousands of dentists throughout the country who are infringing these inventions, although hundreds of them have taken out licenses under the patents.

50 Q. 17. State specifically what, if any, would be the effect on one of the C. M. Richmond crowns, so called and taught by him, if any part of the enclosing cap should be left open or constructed so as to be open.

A. Ultimately the secretions of the mouth would flow in and dissolve the cement and cause the decay of the tooth, and this would be the case even if the minutest hole or perforation were left in the floor of the cap exposed to the flow of the saliva. The secretions of different mouths vary wonderfully in their destructive action upon the cement and on the dentine or bone of the tooth. It is practically impossible to determine without an actual test the destructiveness of the secretions of the mouth. It may generally be stated that the secretions of the mouth are more or less destructive both to cement and dentine. Some cases might be found in which this destructive action was so slight comparatively as to enable the cement to resist its action for a comparatively longer period, say three or four years, though it must ultimately succumb to it; whereas, in other cases, as in that of Mrs. Hewitt's, the destructive action of the secretions of the mouth is so great that even a month is sufficient to demonstrate the inutility of the cap or Richmond crown without the same being perfectly closed, as was the case in his last improvements on his inventions, the circumstances of which I have fully testified to.

Cross-examination of WASHINGTON W. SHEFFIELD by S. J. GORDON, Esq.:

(Defendants' counsel objects to all the foregoing deposition which is not in rebuttal of matter in the defendants' proofs, and subject to that objection proceeds to cross-examine *de bene esse.*)

Cross-Q. 19. About how many years ago did you first see a natural root covered by a metal cap, with the flange extending beyond the surface of the root surmounted by an artificial crown?

A. About five years ago.

Cross-Q. 20. How long before that had you read a description of any such crowned, capped natural root?

A. I had not read any description whatever before that.

Cross-Q. 21. When did you begin the study of dentistry?

A. In 1849 or '50, fully, to attend to it as a business; before that I had read some.

Cross-Q. 22. And since then you have intended to keep yourself fairly well posted on the progress of the dental art in this country, have you not?

A. I have.

Cross-Q. 23. And am I to understand that until within five years you had never seen, or heard, or read of a natural root of a tooth covered with gold, with a band, ring, or flange thereon extending from the surface of such root towards the apex thereof and surmounted by an artificial crown?

51 A. I had heard of it, but had never seen anything of it in print, and had never seen it until I saw it in Dr. Richmond's mouth, in 1881.

Cross-Q. 24. Permit me to ask what you mean by the use of the word "it" in your last answer?

A. I mean by the word "it" the description of the crown or the crown itself.

Cross-Q. 25. The description of what crown?

A. The so-called Richmond crown.

Qross-Q. 26. As I apprehended, Doctor, you misapprehended my questions; I was not inquiring about Richmond crowns.

(With this explanation, cross-question 19 is repeated.)

A. What do you mean by a metal-covered root surmounted by an artificial tooth?

Cross-Q. 27. Mr. Gordon explains: I mean the natural root of a tooth; metal cap with a flange reaching beyond the horizontal surface of such root towards the end of the root; the metal cap or cup, no matter how produced, surmounted by an artificial crown of some kind, as, for example, gold or porcelain. Cross-question 19 renewed.

A. I never heard of such a thing until I heard of the Richmond crown.

Cross-Q. 28. You never heard of what is known as the Dwinelle operation in artificial crown production?

A. Never, until I became interested in the Richmond crown.

Cross-Q. 29. Since then have you familiarized yourself with the Dwinelle method?

A. I have not; it being conceded by all who have talked with me about it to be a nearly useless, impracticable operation.

Cross-Q. 30. It would not be impracticable if it was successfully and practically carried out in the mouth of a human being, would it?

A. I am not familiar enough with the details of the operation to say whether it would or would not be.

Cross-Q. 31. Describe the Dwinelle operation as you understand it.

A. I don't think I am familiar enough with the operation to describe it.

Cross-Q. 32. In a general way, can you tell us what it would be when executed in the mouth of a patient?

A. By conversational descriptions of it, which I cannot recall, my impression would be that it would be impracticable and worthless.

Cross-Q. 33. I am not inquiring anything about the merits or demerits of the thing. My question was designed to call out what would be the component parts of the completed structure—that is, of what elements it would consist or be constituted?

A. Either silver, platina, or gold and porcelain.

52 Cross-Q. 34. And what would be the relations of those constituent parts to each other when the Dwinelle operation was complete in the mouth of a patient?

A. It ought to—I don't know whether it would be so, for I have never seen the operation—present the porcelain in front to represent the natural organ, and the gold somewhere in the rear of the porcelain, and attached in some way to the end of the root.

Cross-Q. 35. And if the porcelain was backed by metal and such metal extended to and covered the horizontal surface of a natural root to which it was secured, and if a flange of such metal cap extended around the horizontal edge and beyond the same, if in a patient, of course, beneath the gum, then such structure, no matter how brought together, would be the same thing as Richmond's artificial crown, surmounting a closed cap upon a natural root, would it not?

A. It would depend entirely whether the structure was properly made or not. If the flange that you speak of extending under the gum was merely burnished over the edge of the root and did not grasp it firmly, thus giving it strength and support, excluding the secretions of the mouth when put in position, it would not be such an operation at all.

New York, *April* 22, 1886.

Cross-examination of Washington W. Sheffield continued by Mr. Gordon:

Cross-Q. 36. But if the flange was a material and substantial flange, firmly united to the horizontal cap on the surface of the root, and becoming thereby, in fact, a component part thereof, then the structure would be the same thing as Richmond's artificial crown, under the conditions enumerated in cross-Q. 35?

A. I would simply say that it would depend entirely upon the construction of such band and union with the horizontal cap.

Cross-Q. 37. In my previous question I have assumed that the flange was something more than a merely burnished surface, but a substantial and reliable band extending towards or beneath the gum from the solid metal cap to which it, the band, was enduringly fixed.

Cross-question 36 renewed.

A. It depends entirely upon the construction and the manner in which it was affixed to the horizontal cap.

Cross-Q. 38. I don't think that you understand my question. It has nothing to do with the methods, ways, or means by which the result is produced. It is about the result itself. This is the question: If a porcelain tooth crown was backed by metal, extending to and covering the lateral or horizontal surface of a natural root to which it is secured; has also a substantial and material operating flange extending from the outer edges of such metal 53 cap towards or beneath the gum, the metal band being securely affixed to such cap, to the exclusion of air, if you please, such structure, no matter how produced, would be, when complete, the thing now usually -nominated Richmond crown, because it would be an artificial crown permanently affixed to a natural root, the surface of which is covered by metal, and a flange extending therefrom towards or beneath the gum?

A. In the first place, I would say that the methods by which such operation was performed would materially affect the result, and what you mean by permanently affixed admits of great qualifications. You may denominate such affixing merely uniting the parts with amalgam or other material that would not at all result in the production of a Richmond crown, so called, and again the band might be utterly useless if the proper methods of producing it were not used. If you will show me a model of what you attempt to describe I will then answer whether it be a Richmond crown or its equal in efficiency to restore a lost natural tooth by a permanent useful crown.

Cross-Q. 39. As I have several times said, I am not seeking information as to the efficiency or degrees of merit or light as to the relative advantages of different methods. I am only asking about the substantial similarity of things when produced. My question, which is a repetition of the last four or five, is this: The Richmond crown, if by that is meant the structure of metal and porcelain made at your place by Richmond in August or September, in 1881, when in position in the patient's mouth, is a natural root covered by a closed flanged cap surmounted by an artificial porcelain crown, is it not?

A. The thing now described and called in question, made at my office in New London late in August or early in September, 1881, is what is called a perfected Richmond crown.

Cross-Q. 40. And, as I understand you, the perfection consists in extending a flange from the cap covering the natural root towards or beneath the gum in such a way as to prevent the action of moisture at the point of union between the cap and root; is that so?

A. It is not so.

Cross-Q. 41. What is it, then?

A. The perfecting of the original Richmond tooth crown was the perfect closure of the bottom of a perfectly fitting band around the root of a natural tooth by soldering to the edges of that band a piece of platina or gold over the back and front surfaces or bevels of such band previous to the affixing of the porcelain face by means of solder.

54 Cross-Q. 42. Please look at the exhibit now shown you—the examiner will please mark "Defendants' Exhibit A. S. R. No. 1"—and say whether the right central incisor, if the metal were present from the band to the backing of the tooth, which has manifestly been cut away, would not present an example of a closed bottom with a perfectly fitting band around the root of a natural tooth surmounted by an artificial tooth crown?

A. It would not.

Cross-Q. 43. Why not? Please explain. Note the previous question carefully, please.

A. Because, in the first place, the manner by which it was constructed makes it impossible to make a perfectly closed cap.

Cross-Q. 44. Does not the right central incisor of that exhibit contain a closely fitting band around the natural root of a tooth?

A. It does not. It would be impossible for me to say that it was a closely fitting band around the root of a natural tooth without seeing it applied to the natural root of a tooth. It might have been in practice a closely fitting band.

Cross-Q. 45. And unless it had been a closely fitting band the operation would have been worthless, would it not?

A. That depends somewhat upon circumstances. In the mouths of some patients bands that are not perfect bands remain some little time without failure, which cannot be denominated worthless.

Cross-Q. 46. Question 45 repeated, with this addition: In that exhibit is it not manifest that the band was the main or the sole reliance in connection with the metal cap which extended across its top to maintain the artificial crown which surmounted it in useful permanence?

A. It is impossible to say from this exhibit whether the fitting of the band was its sole support or whether it had a pin inserted up the root of the tooth.

Cross-Q. 47. From the appearance of the exhibit how long should you say that these artificial teeth have probably been in actual use?

A. It would be impossible from any indication on the exhibit to say whether they ever had been in actual use at all.

Cross-Q. 48. As a practical dentist you would have no opinion on that subject from an inspection and examination thereof, would you?

A. There is a slight discoloration or oxidation upon the backing of the model presented, as having been the backing of a porcelain tooth that may have been artificially produced to represent such oxidation by the secretions of the mouth.

Cross-Q. 49. How much stock have you in the International Tooth Crown Company?

A. The stock book will show. I do not know how much.

55 Cross-Q. 50. According to your best recollection, how much?

A. About one-half of it.

Cross-Q. 51. And your son, Dr. Lucius Sheffield, has about how much?

A. Substantially the balance. There is some little outside.

Cross-Q. 52. What is the capital stock?

A. It is a half a million.

Cross-Q. 53. It is known to you, is it not, Doctor, that a large number of the leading members of your profession deny the merits of Low and Richmond bridge-work?

A. It is known to me, so far as I am able to say at this present, that there is no dentist in America who has the ability to produce it that is not highly in favor of such operations. At first, in 1881 and 1882, when it was entirely new, or at least the combination of the two, there was some opposition to it by some dentists of fair ability—as, for instance, Dr. Gaylord, of New Haven, who told me at our house in Thirty-second street, that he had been one of our worst enemies; that he did not believe in the work, but that it was his own ignorance that produced such opposition; that on seeing it and its working he had become thoroughly converted, and was satisfied that it was the coming dentistry; that therefore he should take hold of it.

Cross-Q. 54. Was Dr. Gaylord talking of crown-work or bridge-work?

A. Bridge-work and crown-work.

Cross-Q. 55. Did your business increase any in 1885 as compared with 1884?

A. It did not. It fell short something like a thousand dollars—perhaps a little more. I am not able to say, but I think less than two, owing to the disability of one of my assistants, who was out of the office, and I was without his help for something like three months.

Cross-Q. 56. How many assistants had you in your office in 1885?

A. Two besides myself for the whole year, and three with the exception of the disability of one of them above mentioned.

Cross-Q. 57. Where is your office?

A. New London, Connecticut; Harris building.

Signature waived.

NEW YORK, *April* 21, 1886.

Present: Walter D. Edmonds, Esq., in behalf of complainants; S. J. Gordon, Esq., in behalf of defendants.

Dr. HENRY A. PARR, witness called on behalf of the complainant in rebuttal, being duly sworn, deposes and says:

Examined by WALTER D. EDMONDS, Esq.:

56 Q. 1. What is your name, age, residence, and occupation?

A. My name is Henry A. Parr; my residence is New York city; occupation, a dentist; age, forty; I am a graduate of the Baltimore College of Dental Surgery; I have been practicing dentistry about fifteen years; I have cliniced to college societies, &c., and am now one of the clinical instructors for the Baltimore Surgery of Dentistry.

Q. 2. Are you acquainted with Cassius M. Richmond?

A. I am very well acquainted with him; I have known him four or five years.

Q. 3. Are you acquainted with Dr. Richmond's inventions in tooth-crown work?

A. Yes, sir; thoroughly.

Q. 4. And have you actually practiced the same in your practice?

A. Yes, sir.

Q. 5. Do you remember what Dr. C. M. Richmond's method of performing the tooth-crown operations were when you first became acquainted with him? And, if so, please state when that was, and describe the operation as it was then practiced by him and talked to others.

A. At that day, when I first saw Dr. Richmond, about 1881 or 1882, the tooth that was broken down—that is, a root without a crown—was repaired by making a gold band which encircled the root. The band was then bevelled on the labial portion and a cap was soldered on the other half of the gold band, not covering the bevelled portion. Then a pin was made to fit in the nerve canal and extending up into this portion of cap. Then a porcelain tooth was bevelled to fit the bevel on the gold band. The porcelain was first backed with platina or gold. Then this porcelain was waxed to the band, the pin waxed in a hole punched through a portion of the cap; it was then placed in position in the mouth and removed very carefully without removing the parts as they were waxed in position. Then it was invested in a portion of sand and plaster mixed with water, and when this become set all the parts were soldered together. It was then finished and polished up and cemented to the root in the mouth.

The operation which I have described is here described by a tooth with a tag attached, marked "Exhibit Richmond Old Operation."

Q. 6. Was the operation that you have described afterwards changed or varied in any way by Dr. Richmond? And, if so, state how.

A. At that time or shortly after he found that the fluids of the mouth got between the porcelain and the tooth and in some cases dissolved the cement, which was objectionable. This was overcome by putting a cap which covered the whole portion of the cir-

57 cumference of the end of the band, which means the end was soldered at the edges all around. This made the band a great deal stronger, less liable to bend, and prevented the leakage heretofore spoken of, and made a more perfect and complete operation in every way, and I have adopted that process entirely, and I think it is in use by all dentists who make this operation, and this is the way I teach at the present day, and it is here illustrated by "Complainant's Exhibit Model No. 2." Exhibit Richmond Sheffield Operation shows the same improvement that I have referred to except that the band was not bevelled. Without this improvement these crowns would not be what they have become to-day, because without it they were constantly becoming loose by leakage.

Q. 8. State, if you please, what your opinion as a practical dentist is of the advantages, if any, of the C. M. Richmond tooth crown as perfected by closing the cap and described in the letters patent to him here in suit over the methods of producing artificial dentures known to the art of dentistry prior to the inventions referred to.

A. First, I claim that the crown operations as that done by me to-day and others is the only correct and perfect dentistry of the day, and it is so far ahead of the old class of work as laid down in medical and dental works that there is no comparison, and that this work has created a complete revolution in dentistry. The old ways are constantly going out of use, and this is fast taking its place. Crowns can be made to resemble the natural dentures so perfectly that it requires close observation or a person very familiar with the work to tell it, when in the mouth, from the natural teeth.

This work is entirely unlike that heretofore produced, namely, when a tooth was broken off or the crown decayed off it was formerly customary to put what is called a peg tooth in its stead. This was made by drilling the nerve canal larger. Then a porcelain tooth with — hole in it was ground to fit that root. Then a piece of wood was made to fit the hole in the porcelain; also the hole in the root. It was then pressed into position. In all cases this was unsatisfactory to the operator as well as the patient, but as we knew of no other device this had to answer the purpose.

The objections to a tooth of this kind were many. The wood would often swell and split the root, which would cause the entire loss of the root, and the root would be often split by mastication. The wood was liable to break or work loose. The wood being exposed to the secretions of the mouth or the fluids of the mouth, it would absorb the same and become offensive, and at the same time would hasten the decay, which would soon loosen the peg, and the tooth would soon drop out.

58 Now, speaking of the inventions in suit:

With this style of work a tooth or root that has been broken down and out of use for months or years can be reclaimed and made to do duty as well as before the decay or disease set in.

By this way the root is encased within a gold cap with a porcelain front, which approximates in color and shape to the one lost, and answers the purpose so comfortably that a patient is at a loss to know whether it is his own tooth, unless his attention is adverted to it by the sight of the gold on the inside of the mouth, which resembles very much a gold filling.

Why I claim that this work is better than the old style or the work laid down in the works on dentistry or that formerly taught in the schools is that the root is first encircled by a gold band which fits the root closely, going under the margin of the gum, protecting it from the fluids of the mouth, which is also a protection against decay and also prevents the root from splitting, and also giving a greater support in carrying the porcelain which is affixed thereto. Then the nerve canal is enlarged to receive a pin of platinum and iridium, which extends the full length of the root, giving strength thereto. Then this cap and canal is filed with a cement which crystallizes and becomes as hard as a bone and leaves the root in a hermetically sealed and in a good and healthy condition. If the parts hereto affixed are not impervious to the fluids of the mouth I claim that the operation is imperfectly done, and the result will be the same as in the old style of peg teeth, where the fluids get in between the porcelain and the root and the decay goes on more rapidly than if the mechanical appliances were not affixed thereto.

Therefore too much importance cannot be placed on a tight cap, as even a small hole or perforation would be disastrous.

This action of the fluid of the mouth manifests itself more or less rapidly, and this I have only discovered by constant practice in applying these dentures during a term of years.

Q. 9. State what has been your practical experience as an operating dentist of the merits of the inventions here in suit as evidenced by public and professional appreciation of them ?

A. When I first began to do this work it was discountenanced by the profession and spoken of as impractical, as being unneat, and would soon prove a failure, not only in my hands, but in all who practiced this class of dentistry.

My experience has been entirely to the contrary, and those who spoke in derision of the work then are practicing it to-day with comparatively good success, and do not hesitate to say that the work is beautiful and the coming dentistry of the day. They have had it put in their own mouths by me.

59 I have had the pleasure of instructing old and young in this new style of work, which they are very much pleased with, and it has added greatly to my reputation and practice as a professional man and as an expert on crown work.

All the work that I have inserted of this description has given universal satisfaction.

Cross-examination of Dr. Parr by S. J. Gordon:

(Defendants' counsel objects to all the foregoing deposition which is not in rebuttal of matter in the defendants' proofs, and subject to that objection proceeds to cross-examine *de bene esse.*)

Cross-Q. 10. How many instances, at a rough guess, Dr. Parr, do you think you have ever known in all of the different varieties of Richmond crown settings—half crown, whole crown, and all kinds?

A. The variety I could not say much about, but the number of times it has been put in the mouth numbers thousands.

Cross-Q. 11. And of those thousands, in your judgment, what proportion of them have been sealed-cap operations? By that I mean a solid metal cap over the natural root, with a flange extending about the sides of the root.

A. Well, I should say two-thirds to three-quarters.

Cross-Q. 12. That is, solid cap ones?

A. Yes.

Cross-Q. 13. In your judgment, what proportions of the dentists setting what are known as Richmond artificial tooth crowns now employ the solid cap and flange or some of the earlier ways you have spoken of?

A. I am not in a position to answer that question, as I do not know the practice of other dentists.

Cross-Q. 14. How many years have you known a Richmond tooth crown to stand when applied without the solid cap and flange?

A. I could not tell that without I took one off and was given the date when it was put on.

Cross-Q. 15. Question repeated.

A. I have some that I have taken off, but I don't know when they were put on. I have some on that I put on (4) four or (5) five years ago. I was speaking of those put on both ways.

Cross-Q. 16. And up to this date they stand equally well, as I understand you?

A. I don't remember taking off any that had closed caps, and I have some that were open.

60 Testimony for complainant on final hearing in rebuttal, taken before George H. Evans, notary public, special examiner, by consent, under rule 67 of the U. S. Supreme Court as amended.

NEW YORK, *April 6th*, 1886.

Present: E. N. Dickerson, Jr., for complainant.

HENRY L. BREVOORT, a witness produced on the part of the complainant, having been first duly sworn, in answer to interrogatories propounded by Mr. DICKERSON says:

Q. 1. What is your name, age, residence, and profession?

A. My name is Henry L. Brevoort; I am 36 years of age; I reside in the city of Brooklyn and State of New York, and I am by profession a mechanical engineer.

Q. 2. What experience have you had in the pursuit of your profession? Have you ever been called upon to testify in suits relating to patents, and have you any familiarity with dentistry or dental operations?

A. As a boy I worked in a machine shop, and I have ever since continued to practice my profession, designing, constructing, and testing machinery and the usual work that devolves upon an engineer. For the last ten years I have been very frequently called upon each year to testify as an expert witness before the circuit courts of the United States, both in this and other circuits, in suits relating to patents, and I have so testified in many hundreds of cases. I have during such experience been called upon to familiarize myself with dental operations and the manufacture of artificial teeth. In 1876 I devoted considerable attention to the matter and worked for some time in a dental laboratory so as to familiarize myself thoroughly with the various processes there practiced. This work was done on behalf of the Goodyear Dental Vulcanite Company.

Q. 3. Have you heard read the testimony of John E. Earle, expert for the defendants herein?

A. I have.

Q. 4. Please look at the fifth answer of Mr. Earle and, with especial reference to "Defendants' Exhibit Scott," state whether that article is intelligible to describe any definite operation, and what operation, in your opinion, would come the nearest to that description.

A. I have carefully read the description. From it it is impossible to tell with reasonable accuracy what the operation performed was. The description is almost unintelligible, certainly unintelligible to enable one to ascertain from it any particular form of operation. Whatever the caps referred to may have been, whether they were mere plates or whether they ran up alongside of the tooth, cannot definitely be told, but one thing in the description is certain, and that is that there was a plate bearing upon the gums and the surfaces adjacent thereto, the gums receiving the varying pressure
61 brought to bear upon the plate. In any operation which involved the use of a plate to bear with a varying pressure upon the gums it is clear that such operation cannot show the inventions or any of them which are in controversy herein. None of the artificial dentures which are involved in this litigation are intended to be or could be utilized in connection with plates, this being the method which it is the object of the present inventions to do away with. I might add that, as far as I can understand from the description in "Defendants' Exhibit Scott," the caps were probably nothing but plates or disks, partial or whole, and which cover partially or wholly the grinding surfaces of the teeth. In this way the front teeth would be kept further apart by these interpositions between the grinding surfaces of the upper and lower teeth—the front teeth could be kept further apart—and the work of mastication would be forced upon the back teeth. I find further on, to wit, on page 63, the following statement. This is the statement to which I refer: "In cases of the abrasion of the front teeth, as mentioned before, caused by the wearing away of the grinding surfaces of the back ones, nothing more is necessary to prevent the symmetry of the teeth from being destroyed than to cover and fit accurately their indentations with a plate of gold which, according to its thickness, will equalize the pressure on the front teeth." From this quotation it appears that these caps were merely put upon the back teeth and

upon the grinding surfaces thereof so as to cause them to articulate with the other teeth opposed to them, and thus they did their share in mastication and did not necessarily throw the food to be chewed to some other part of the mouth where the teeth met too strongly. Thus was accomplished the result desired by the dentist—that is, the mere interposition of a disk upon the surfaces of the grinding molars which had been previously worn away; the front teeth were prevented from coming in contact, necessarily preventing their abrasion. I herewith produce a model which represents my idea of the operation referred to. I am by no means clear that this accurately represents such operation, but it is in accordance with the description, and is more likely to represent it than any other form with which I am acquainted.

(Witness continues:) I produce the model representing what I suppose the Scott operation to have been.

Complainant's counsel offers the said model in evidence and marks it "Exhibit Brevoort Scott Model."

Q. 5. Can you refer to any other exhibit in this case in which you find that a protecting plate covering the end of a tooth is called in dentistry a cap? If so, please do so.

A. I quote again, but this time from "Defendants' Exhibit Lintott," from page 108, where I find as follows: "In cases where it is requisite to increase the height of the molar teeth this will be easily effected by carrying the gold plate over the surface of the
62 shortened teeth, and if this be insufficient the plate may be doubled over the grinding surface or may have a piece of ivory rivetted onto it. If such tooth be firm the capping may be made to fit so closely as to spring in toward the neck of each tooth, and this will afford a most advantageous security to the whole piece. If, on the contrary, the remaining molars be loose, the capping must be made to discharge the office of a shield towards them, and, thus relieved from pressure, they will probably regain a greater degree of firmness."

From the above quotation it will be seen that a plate either pressing upon or arranged in close proximity to the flattened surface of a tooth is called in dentistry a cap, though it is not a *cup*.

Q. 10. Please look at Exhibit Richmond Old Operation and compare the same with the operation described in the C. M. Richmond patent, No. 277,941, with reference to the sealing of the cap.

A. I have carefully examined Exhibit Richmond Old Operation. It consists of a porcelain tooth attached to a ring of gold at its upper part. The tooth itself, where it meets the ring in front, leaves an opening, so that in no sense is a perfectly closed cap formed, and the juices of the mouth can get inside of the gold ring and act upon the cement put within the said ring for the purpose of holding the artificial denture to the natural root. For this reason the Richmond Old Operation does not show the perfected invention set forth in the said Richmond patent. Mr. Earle in his deposition seems to consider that hermetical sealing can be obtained by the use of cement. If this is what he means, and I think it is, it is clear that he does not understand the hermetical sealing referred to in the Richmond patent. The sealing intended to be described in the said patent is first of all shown in the drawings as a hermetical sealing effected by the continuous metal walls. Figure 2 and figure 7 of the patent clearly show this. The specification says as follows: "It will be seen that when this denture is applied to a root the end of the root is entirely protected from the injurious action of the fluids of the mouth and is hermetically sealed, being covered by a closed cap. This enclosing cap is of the greatest importance, because otherwise decay must necessarily take place by reason of the action of the fluids of the mouth on the exposed dentine, and the denture would become useless." This language is clear and specific. A closing by cement is not a hermetical closing in the sense of this patent, because the juices of the mouth at once act upon the cement, and whatever security the cement may have furnished at the beginning is lost by reason of its disintegration, and therefore Mr. Earle is entirely in error when he states that the hermetical closing of the patent can be effected by the use of cement.

Q. 11. Will you be good enough to loosen, if possible, the root in Exhibit Searles No. 2, so that the structure of the top of the cap may be examined?

63 A. I have loosened, under the instruction of the question, the root from Exhibit Searles No. 2, so that the structure of the top of the cap may be examined. The result is that there is no cap in said exhibit. There is a ring of gold, into which ring the porcelain tooth projects, as can clearly be seen by looking at the exhibit. Therefore this exhibit does not show any hermetically sealed cap, but, on the other hand, merely a ring between which and the porcelain tooth the juices of the mouth can enter and injuriously affect the cement placed in contact with the end of the natural root and the inner portion of the artificial denture. Apparently a half floor of platinum had been placed within the gold ring before the solder was flowed in.

Q. 12. The root of Defendants' Exhibit Searles No. 1 being loose in the operation, will you be good enough to remove the remains of the cement within the bands, in order that that operation may be clearly visible?

A. I have done so. I find that there is an opening through the front of the floor; thus it is not a hermetically closed cap. There seems to be a partial floor of gold, which, as far as can be ascertained, is made of gold foil stuffed into this location before the solder was flowed over the back of the denture.

Q. 13. Please look at Exhibits Searles No. 1 and Searles No. 2 and state whether they embody the invention of the Richmond patent and claimed in the claims thereof.

A. It seems scarcely necessary for me to reconsider Searles No. 2 in this connection, for I have already stated after carefully examining the exhibit that there was no closed cap arranged to surround the end of the natural root, and, of course, if such cap is not present the complete invention of the Richmond patent is not involved. As to Searles No. 1, I have examined it with magnifying glasses and with a microscope, and I do not find that there is a closed cap. There is a platinum floor, but it is not closed. Therefore the tooth cannot show the perfected invention of Richmond, for it does no show any hermetically closed metallic cap, and without this the said perfected invention is not found. Therefore neither Searles No. 1 nor Searles No. 2 shows the completed invention of the C. M. Richmond patent, No. 277,941.

Q. 14. Please look at the Defendants' Exhibit Gaylord Model and state how the teeth there shown compare with the artificial dentures described and claimed in said Richmond patent, 277,941.

A. I have examined the teeth in the Exhibit Gaylord Model. The tooth with the pin in it has not got a closed cap, but, on the other hand, apparently is made intentionally open, so that the cement used in attaching the tooth would be reached and affected by the saliva of the mouth. This clearly does not come within the invention of the Richmond patent, which specifically describes a cap positively closed at the bottom, so that the juices of the mouth are prevented from coming in contact with the cement.

64 In the case of the tooth shown with the screw upon it the cap is not entirely closed, and in this case it would be entirely immaterial whether the cap was or was not closed, for the juices of the mouth could pass up around the body of the screw, and in this way attack the cement where it was placed between the root of the tooth and the ferrule. Therefore neither of the teeth in the "Exhibit Gaylord" show the completed invention described in the Richmond patent inquired about.

Q. 18. Will you please state whether, in practice, the artificial porcelains would be liable to become more loose from their original contact with the metal plate?

A. Yes; in use.

Q. 19. Will you please state whether the continuous floor in front performs any other function beside that of sealing the root and from the fluids of the mouth?

A. The plate performs another and very important function, and that is this: Without the plate the gold ring is liable to distortion, while when the plate is soldered to the ring all around the said ring is thus additionally strengthened, and the denture, as a whole, is made very much stronger.

And being cross-examined:

Cross-Q. 26. State exactly what was done in order to remove from Searle No. 2 the root which when I last saw that exhibit was in it.

A. The root came out with a little pull. With a point of a compass point I carefully picked out the cement. I then gave it to the counsel for the complainant.

Cross-Q. 27. Did you do everything yourself which was involved in removing that root and picking out the cement in Searles No. 2 so as to leave it in its present condition?

A. I did.

Cross-Q. —. These same answers would refer with equal accuracy to Searles No. 1, would they not?

A. Yes.

Cross-Q. 29. Please point out in Searles No. 1 the opening which you say, in answer to the 13th question, you find through the front of the floor.

A. I indicate it to the counsel and offer him a glass by which it can clearly be seen.

Cross-Q. 30. Will you please examine the bottom of that opening in a side light and say whether you can see any traces of metal?

A. I have examined it. In one part of the cavity there seems to be a little solder.

Cross-Q. 31. Say whether or not that exhibit, in your judgment, evidences an intention to completely cover the bottom of the band with a floor of metal.

A. To my mind it shows that the operator did not know whether he was going — cover the entire floor when he did the work, and that he did not care whether he was going to cover the entire floor.

Cross-Q. 32. I suppose, when you took the roots off this exhibit, you found the uncovered surface to be one of cement, did you not?

65 A. Yes; but there was not much cement in either case.

Cross-Q. 33. Did you perform the work of polishing or filing the metal surface on the front edge of the band, which I also notice is a change on this exhibit?

Counsel for complainant states that when that operation was first cut he was of the opinion, on account of the dirt from the wheel, that it was completely open; that thereafter he was informed by Mr. Earle that he and Mr. Beach had cleaned the operation and had become convinced that there was a metal junction at the front of the ring, but there was still some dirt and roughness there, so that he, counsel for complainant, could not determine the question, and that he therefore removed the still adhering dirt or extraneous matter from the front edge of the junction with the edge of a knife point, with the result which is now apparent.

Counsel for defendant expresses his entire satisfaction.

A. No.

Adjourned to April 22, 1886, at 11.30 a. m.

New York, *April* 22, 1886.

Met pursuant to adjournment.
Present: Same parties.

Cross-examination of Mr. Brevoort by Mr. Beach continued:

Cross-Q. 76. Please look at claim six of the Richmond crown patent, No. 277,941, and say whether you do not find that that claim is substantially anticipated by the prior art.

A. No; I don't.

Cross-Q. 77. If in the "Exhibit Richmond Old Operation" the operation of flowing solder upon the backing and pin-and band were continued until it covered the porcelain face "exposed on the inside," the result would then be practically what is shown in figure 2 of the C. M. Richmond patent, No. 277,941?

A. If the solder could be flowed all over the interior of the fer-ule or ring it would then, so far as a hermetical closure is concerned, be like figure 2—that is, the solder must form a floor complete in the ring, and the root would be hermetically sealed, being covered by a closed cap.

Cross-Q. 78. This Fig. 2, as I understand the specification and drawings, is the completed operation of which figures 3, 4, 5, and 6 represent preparatory stages, is it not?

A. Yes.

Cross-Q. 79. Now, if I understand correctly figures 3, 4, 5, and 6, the porcelain portion of the operation is, prior to the flowing in of the solder, directly exposed or uncovered on its inside beveled upper surface, is it not?

A. Yes.

66 Cross-Q. 80. Now, would it be possible, in your judgment, to flow solder into that structure so as to make the structure shown in figure 2—I mean so that the solder would evenly fill the band so as to form a floor such as is shown in figure 2?

A. I don't know whether it could be done exactly in the way suggested. It undoubtedly can be accomplished without any difficulty.

Redirect examination by Mr. DICKERSON:

Redirect Q. 84. Please look at Defendants' Exhibit Richmond Model No. 2 and state whether that is or not the thing described in the Richmond patent No. 277,941, and whether there would be any difficulty whatever in making that operation if the instructions of the patent were followed, or any doubt whatever that that is the operation described in said letters patent.

A. There is no doubt that it is the only thing described in the patent. It could be made readily by reading and following the instructions therein contained.

Redirect Q. 85. Please look at Defendants' Exhibit Searles No. 1 and state whether or not the opening now in the bottom of that operation necessarily existed there at the time the operation was put in place in the patient's mouth, and give your reasons for the conclusions which you may express.

A. I have examined Exhibit Searles No. 1 carefully under a powerful magnifying glass. I find an opening in the gold around the pin, and also another opening about in the middle of the gold which forms a part of the floor. These holes go through to the porcelain of the tooth. Underneath the partial floor I find cement. This only could have gotten in this position when the tooth was placed upon the natural root, and, to get to the position it has reached, it passed through the holes in the partial floor. This is conclusive evidence of the very best kind that these holes existed in the partial floor when the tooth was placed in the mouth of the patient.

Redirect Q. 86. Have you heard the testimony of Dr. Gaylord, upon cross-examination, in regard to the making of "Exhibit Searles No. 2"?

A. I have.

Redirect Q. 87. Will you state whether that testimony is possibly true, in view of what you see in that exhibit?

A. The testimony stated that there was an entire metal floor. I do not think it is possible that there could have been an entire metal floor ever in this exhibit. The partial floor stops on the top of the porcelain tooth, leaving a large portion of it exposed and an edge square across as it would be if the metal had been cut before being placed in position, which undoubtedly was what was done. This "Exhibit Searles No. 2" is exactly like the old Richmond Operation, except that the partial floor is carried in the Searles Exhibit a little way onto the porcelain.

67 Redirect Q. 88. Was any part of the floor whatever removed by you in the process of removing the root from that Exhibit Searles No. 2, and do you state positively that it is now in identically the condition in which it was when you removed that root, so far as the metal portions are concerned?

A. It is in identically the condition that it was when I removed the root. I did not remove any of the floor, but the floor is in precisely and identically the condition it was when the tooth was first shown to me, and before the removal of the root, with the exception that the cement has been removed. As proof of the fact that I removed none of the floor, I state as follows: I used a compass point to pick out the cement. The compass point was not injured or affected, and a compass point could not have cut through that floor. Therefore, as I had no tool capable of cutting through the floor, even if I wished to, it is evident that the tooth is in the same condition it was when it was first shown me. When the root was drawn out of the fer-ule so much of the cement came with the root that before any attempt was made to remove all the cement you could see that the floor did not extend over all of the porcelain by the light shining through the porcelain tooth. Of course, up to this point no instrument had entered the fer-ule at all.

Redirect Q. 90. Have you examined the published exhibits heretofore offered in evidence by the defendants in this case?

A. I have, all of them, with care.

Redirect Q. 91. Do you find any of them that have any relation to the patents here in suit, as near as those referred to by *by* Mr. Earle, even assuming that those referred to by Mr. Earle have any bearing upon the questions here in controversy?

A. I do not.

Redirect Q. 92. Please look at "Exhibit Richmond Screw Operation," referred to by Dr. Northrup, and state whether, in your opinion, it was possible that the platina in the front of that operation was or could have been removed or separated by the fracture of the porcelain at its upper part, as indicated in that exhibit.

A. The platina never was fast to the ferrule. The breaking of the piece of porcelain could not have affected the platina floor, because the porcelain has no attachment to the platina floor, and from the shape of the ferrule and the porcelain it could not have been forced inward.

No recross-examination.
(Signature waived.)

68 INTERNATIONAL TOOTH CROWN COMPANY
vs.
GAYLORD *et al.*

COMPLAINANT'S EXHIBIT RICHMOND CIRCULAR No. 1. April 22, 1886. G. H. E., Sp. Ex'r.

Removal.

C. M. Richmond & A. S. Richmond, dentists, inventors of the Richmond tooth crown and bridge-work, have removed from 26 West 32d St. to 70 West 35th street.

Patients will receive personal attention.

(Over.

References by Permission.

President Barnard	Of Columbia College.
Mr. Samuel Sloan	President of the Lackawanna R. R.
Mr. D. O. Mills	Broad and Wall streets.
Gen. H. D. Wallin	United States Army.
Mr. Samuel Colgate	35 John street.
Mr. Joaquin Miller	11 East Twenty-ninth street.
Mr. Lewis Leland	Sturtevant House.
Dr. A. Russell Strachan	66 Madison avenue.
Mr. F. E. Trowbridge	Windsor Hotel.
Mr. Henry Sanford	Windsor Hotel.
Mr. F. J. Allen	Astor House, N. Y.
Mr. I. Bernheimer	322 Broadway, N. Y.
Mr. Jacob Stettheimer	63 Liberty street.
Mr. J. G. Mills	Broad street.
Dr. J. S. Eschelman	Philadelphia, Pa.
Mr. Wm. I. Schenck	325 Fifth avenue.
Mr. P. H. Watson	
Dr. M. S. Chambers	Pres't West India Manufacturing Co.
Dr. F. Leroy Satterlee	21 West 19th street.
Gen. Mansfield Lovell	
Judge Nelson J. Waterbury	
Gen. V. D. Groner	Norfolk, Va.
Gen. Rob't D. Lilley	Washington and Lee University, Va.

EXHIBIT RICHMOND COMPANY'S CIRCULAR No. 1. April 22, 1886.
G. H. E., Sp. Ex'r.

Caution.

All persons are hereby notified that Doctors Cassius M. Richmond
and Alvan S. Richmond, of No. 70 West 35th street, New York, are
no longer authorized to perform any operation involving the use of
the well-known Richmond tooth crown process, embracing the
application of artificial teeth without plates; said process in all its
details is covered by letters patent of the United States, which are
now owned exclusively by the International Tooth Crown
69 Company. All licenses under which said Doctors Richmond
have been performing such operations are forfeited and annulled, and any person so operated upon by either Cassius M. Richmond or Alvan S. Richmond is liable to prosecution for infringement and will be held responsible for damages by the International Tooth Crown Co. For further information apply to Sheffield Tooth Crown Co., the duly authorized licensee and agent of the International Tooth Crown Co., 26 West 32d street, New York. A few inquiries before being operated upon by either of the Doctors Richmond will save the expense and trouble of a litigation.

INTERNATIONAL TOOTH CROWN CO.,
Per L. T. SHEFFIELD,
Treas., 26 West 32d Street.

EXHIBIT RICHMOND COMPANY'S CIRCULAR No. 2. April 22, 1886.
G. H. E., Sp. Ex'r.

26 WEST 32D STREET, NEW YORK, *Aug. 23d*, 1883.

M. —— ——.

DEAR —: We regret exceedingly the circumstances which make necessary the announcement herewith enclosed.

Our company is the exclusive owner of some thirteen letters patent purchased from the Doctors Richmond, and also of several other dental patents purchased from other inventors, covering all rights to make use of these inventions in the United States and in Europe.

We have paid sums of money aggregating twenty-seven thousand dollars for the services of Doctors Richmond while in our employ, including payment for the thirteen patents above named.

Dr. Sheffield purchased all the inventions incident to this process made by the Richmonds, and has taken out patents, both in this country and in Europe, covering said inventions and incurring large expense to himself.

Dr. Sheffield also paid, on his own account, all the money necessary for the establishment of our business, both for advertising and general disbursements, aggregating sixty thousand dollars.

The Doctors Richmond were practicing under a license and agreement granted them by the International Tooth Crown Company, but this license is now forfeited and annulled, the Doctors Richmond having broken every important covenant in the above-named license. They have refused to pay their license fees; they have slandered our good name and reputation, and have sought to induce our licensees not to pay their license fees, and endeavored to prevent dentists from taking out licenses.

We have waited patiently, hoping that the Doctors Rich-
70 mond would desist from their course, but to protect ourselves against these men we are forced to speak plainly.

INTERNATIONAL TOOTH CROWN CO.
L. G. SHEFFIELD, *Treas.*

Exhibit Richmond Circular No. 2. April 22, 1886. G. H. E., Sp. Ex'r.

Notice.

I hereby agree to bear any expense that any one is put to by any suit for damages by the so-called Sheffield Tooth Crown Co.

Litigation is what I want.

C. M. RICHMOND, D. D. S.,
70 West 35th Street.

Complainant's Exhibit Richmond Letter No. 1. April 22, 1886. G. H. E., Sp. Ex'r.

By the Richmond patent process of setting tooth crowns on the roots of teeth we obviate the necessity of wearing a plate, and perfectly imitate the natural organs in form, color, and usefulness.

Dr. C. M. RICHMOND,
Dentist,
70 West 35th street.

New York, *Aug.* 23*d*, 1883.

Dr. L. T. Sheffield.

Dear Sir: I wrote Mr. Lyon that if the lying to patients was not stopped I should put a man on the street to notify people of my removal. He replied to me, Go ahead, and kept up the misrepresentations. My contract with you was not kept for the same reason, as I know from the day I left all people who you thought were worth keeping were deceived. I have the name- and address- of over thirty people and *of* the am't of money paid by each, which would more than double the am't of my ten per. cent. of the crown-work which my license calls for.

You are not on the right road to success to come into a fight with me, but the treatment of me for a year past has proven to me that I must fight to live. Don't misconstrue this letter, as my matter is now in the hands of my att'y for defence. If you wish to settle it in the court, I wish you success, and have always, but not at my expense.

Respectfully, C. M. RICHMOND.

71 COMPLAINANT'S EXHIBIT RICHMOND LETTER No. 2. April 22, 1886. G. H. E., Sp. Ex'r.

By the Richmond patent process of setting tooth crowns on the roots of teeth we obviate the necessity of wearing a plate, and perfectly imitate the natural organs in form, color, and usefulness.

DR. C. M. RICHMOND,
DENTIST,
70 West 35th street.

NEW YORK, *Aug.* 23*d*, 1883.

Dr. L. T. Sheffield.

DEAR SIR: I wrote you a personal letter to-day, and it was opened by Lyon. You can get it & note its contents.

I wrote him a letter & told him that if the same treatment was continued in toward my pat-ents I should advertise my removal in 32d street.

Mrs. Palmer was sent to me by Allen, of the Astor House, and so told the people of the office, and she was lied to, and a circular was put into her hands with my name on it, and all sorts of devices resorted to to keep her in the office, and the result is a suit for $5,000 damages.

Your treatment of my individual patients and the talk about me and my brother is the cause of existing circumstances, and it has been persisted in since the day I left, and you must know that I am not willing to submit.

I enclose a letter now with my name in it from your office, and it still looked bad to the people who it was sent to.

I am not trying to avoid any trouble you may give me, for I am ready to meet you by facts, which you can't refute, from men who cannot be impeached.

Your trying to antagonize me is the unluckiest day's work you could do, which will surely be proven in our suit which must surely come.

I tell you now I can produce 25 people who have been told in your 32d-St. office I was in Saratoga for the summer, and all sorts of stories, to induce people to stay there who had been recommended to me by my former patients.

I wish you success, but not at my expense; and if the agreement had been lived up to you should have had your ten per cent. and your patents in a fair way to have paid you something now. I am ready to go into court with you on any issue.

Respectfully, C. M. RICHMOND.

P. S.—Ask your Scott friend for the correspondence.

72 & 73 COMPLAINANT'S EXHIBIT RICHMOND LETTER NO. 3. April 22, 1886. G. H. E., Sp. Ex'r.

By the Richmond patent process of setting tooth crowns on the roots of teeth we obviate the necessity of wearing a plate, and perfectly imitate the natural organs in form, color, and usefulness.

DR. C. M. RICHMOND,
DENTIST,
70 West 35th Street.

NEW YORK, *Sept.* 10, 1883.

V. M. Smith, Esq.

MY DEAR DOCTOR: Yours of 7, 9, '83, at hand, and in answer will say that I am about to commence suit in the supreme court to have the patents in my name set aside. Cause good & claim valid & legitimate. My brother has started one for 20 M for slander & defamation, &c., &c. I shall also institute another; same cause, &c., &c. There are now 2 commenced against them, for 5 M each, for malpractice & obtain'g money under false pretences.

If L. T. has a patent for the molar — or facing porcelains it is not valid & cannot hold in a suit. Dr. Wise made the first case of that kind in the office at 26 West 32d St. Drs. Gaylord & Williams returned licenses. Horsey ignored it; so does Cowles, of Rome, and McKirjan, I believe, of Newark, and one dentist of Ithaca, name forgotten, is the only one I know paid anything. When I returned home the enclosed circular was put on 32d St., 2 men, one each side of the door. S. put one in front of ours, but has taken him off. Ours are still on the street. I send you copies of them all. There's music in the air. I met Parr Saturday, and he thought we had better have an armistice. I told him our flag was black. Grout has gone to Europe, Robinson to Boston, and where the others are going I don't know. C. M. is out in the country; may be home any day. Send you copy of Home Journal. Had the same in yesterday's Tribune and Sun & will have the same in Times and World next Sunday.

He can't beat us. Who can he?

Yours, &c., A. S. RICHMOND.

Will write you in a day or so. I did not get this until a day or so ago, for it was misdirected.

Truly yours, V. M. S.

75 UNITED STATES PATENT OFFICE.

CASSIUS M. RICHMOND, of New York, N. Y., assignor to the Richmond Tooth Crown Company, of same place.

Artificial Denture.

Specification forming part of Letters Patent No. 277,941, dated May 22, 1883; application filed December 1, 1882. (No model.)

To all whom it may concern:

Be it known that I, Cassius M. Richmond, of the city, county, and State of New York, have invented a new and useful improvement in artificial dentures, of which the following is a full, true, and exact description, reference being had to the accompanying drawings.

My invention relates to an improved process of preparing artificial dentures, and to an improved tooth-crown which may be prepared by said process.

I have previously patented, on the 10th day of February, 1880, a tooth-crown. The present invention consists in an improvement upon the tooth-crown therein described, being simpler in construction and more permanent when finished.

In my drawings similar letters refer to similar parts.

(Here follows diagram marked p. 74.)

Figure 1 represents a view of the root with the tooth-crown applied; Fig. 2, a sectional view of the same; Fig. 3, a section of the prepared root with the ferrule in situation; Fig. 4, a view of the prepared root with the crown in situation, being there held by wax; Fig. 5, a view of the incomplete crown shown in Fig. 4 when removed from the tooth; Fig. 6, a view of the same with the attaching-pin in position ready to be invested. Figs. 7 and 8 represent views of a modified ferrule.

A represents the root. In practice a hole, J, is drilled in the same, as shown. The end of the tooth being then properly prepared, a ferrule, B, is made of such a size as to exactly fit the base of the root. This ferrule is shown in position in Fig. 3. A suitable crown, C, is then selected to be applied to the root. Of course color, size, and shape should be consulted in this selection. Upon the back of this crown is placed a protecting platinum or gold plate, D, which has holes through it to allow of the passage of the pins E, which are firmly embedded in the porcelain in the well-known manner. The root and crown having been so prepared, the crown is placed in position and attached to the ferrule by wax G, as shown in Fig. 4. This wax will hold the crown sufficiently firmly in position to allow of the removal of the ferrule B. In Fig. 5 the ferrule B and the crown attached thereto by wax are clearly shown. Thereafter a suitable pin, Z, is embedded in the wax, as shown in Fig. 6. This pin is designed to enter the hole J, drilled in the root. The prepared

(No Model.)

C. M. RICHMOND.

ARTIFICIAL DENTURE.

No. 277,941. Patented May 22, 1883.

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Fig. 1.

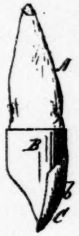


Fig. 3.

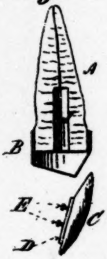


Fig. 5.

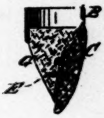


Fig. 2.

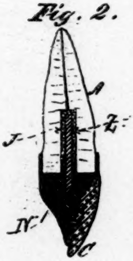


Fig. 4.

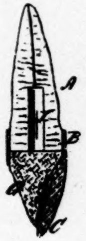


Fig. 6.

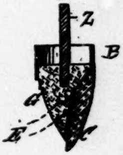


Fig. 7.

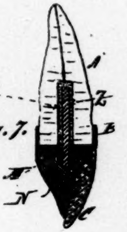
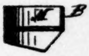


Fig. 8.



Witnesses:
Geo. H. Evans
A. Greff Jr.

Inventor:
Cassius M. Richmond
By his Attorney
E. N. Dickerson Jr.

crown shown in Fig. 6 is then invested or protected by a suitable covering of marble-dust and plaster, leaving the wax portion G exposed. This investiture will hold the parts firmly in the position which they are to occupy when placed in the mouth. The wax may then be readily melted from behind the crown and replaced by a suitable gold solder, which may be blown in by a blow-pipe and fused around the pin. This solder will unite with the pin, the ferrule B, the plate D, and pin Z, making a solid metal backing, N, to the crown C, and firmly holding all the parts together. The prepared crown is then slipped upon the prepared root, as shown in Fig. 2, and cemented thereto. The said ferrule, when in position, should project under the free margin of the gum sufficiently to protect the root from decay. That part of said ferrule is likewise concealed from view by the gum. The cement surrounding the pin Z is shown at J.

In Fig. 7 is shown a ferrule in position similar to the one shown in Fig. 2, the difference being that in this case the ferrule is made in the form of a cup surrounding the end of the root, with a hole pierced therethrough. In Fig. 8 the separate ferrule is shown. The method of attaching is the same.

I do not limit myself to a crown prepared by the exact process here described, as said crown might be prepared in other ways; but I prefer the process here described.

It will be seen that when this denture is applied to a root the end of the root is entirely protected from the injurious action of the fluids of the mouth, and is hermetically sealed, being covered by a closed cap. This inclosing-cap is of the greatest importance, because otherwise decay must necessarily take place by reason of the action of the fluids of the mouth on the exposed dentine, and the denture would become useless. By this arrangement, therefore, both the end of the root and so much of the same as might otherwise be ex-
76&77 posed to the fluids of the mouth are hermetically sealed,
and the root is thus protected from the injurious effect which would otherwise result from the action of the fluids. It is obvious, likewise, that by this arrangement the end of the root may retain its natural configuration, and its substance is not destroyed by cutting away or shaping the same at the sides, which is very injurious and tends greatly to the destruction of the root. It is obvious that this part of my invention—namely, the sealing-cap on the end of the root—may be used with other kinds of dentures and other arrangements of artificial crowns besides those shown herein, and that, when properly applied, the root is completely protected. As shown in Figs. 2, 4, and 7, the flange of the cap should project beneath the gum and allow the gum to extend to the porcelain crown. The freedom of the gum from permanent attachment with the end of the root allows this band to be placed in position without causing irritation. I do not limit myself to the precise method of attaching this inclosing-cap to the root, as other methods might be employed; but the one here shown is the simplest known to me.

The caps hereinbefore described are so constructed, as set forth, as to cover and inclose the prepared end of the root, wholly excluding the juices of the mouth therefrom, and preventing the decay that would otherwise result.

What I claim as my invention, and desire to secure by letters patent, is—

1. The combination of a prepared root, having its natural terminal contour near the margin of the gum, with an inclosing-cap attached thereto for supporting an artificial denture, substantially as described.

2. The combination of a prepared root, having its natural terminal contour near the margin of the gum, with an inclosing-cap attached thereto, and with an artificial porcelain or other crown supported by said cap, substantially as described.

3. The combination of a prepared root, having its natural terminal contour near the margin of the gum, with an inclosing-cap attached thereto, the said cap being attached to the root by a pin or suitable attaching contrivance passing upward and into a suitable cavity in the root, substantially as described.

4. The combination of a tooth-crown, a metallic backing soldered to said crown, and a pin firmly soldered to said artificial backing and secured to and passing through a ferrule adapted to surround the root, substantially as described.

5. The combination of the crown C, provided with suitable attaching-pins, E, the backing-plate D, and the metallic backing N, united to ferrule B and pin Z, substantially as described.

6. The combination of the crown C, metallic backing N, united to protecting-plate D and pin Z, the root A, and cement J, uniting the pin Z to the root, substantially as described.

CASSIUS M. RICHMOND.

Witnesses:
GEO. H. EVANS.
WM. A. POLLOCK.

79

UNITED STATES PATENT OFFICE.

CASSIUS M. RICHMOND, of New York, N. Y., assignor to the Richmond Tooth Crown Company, of same place.

Preparing Roots of Teeth for Reception of Artificial Dentures.

Specification forming part of Letters Patent No. 277,943, dated May 22, 1883; application filed January 8, 1883. (No model.)

To all whom it may concern:

Be it known that I, Cassius M. Richmond, of the city, county, and State of New York, have invented a new and useful improvement in preparing roots of teeth for the reception of artificial dentures, of which the following is a full, true, and exact description, reference being had to the accompanying drawings.

(Here follows diagram marked p. 78.)

(No Model.)

C. M. RICHMOND.

PREPARING ROOTS OF TEETH FOR RECEPTION OF ARTIFICIAL DENTURES.

No. 277,943. Patented May 22, 1883.

Fig. 1.

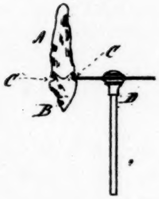
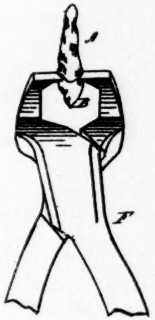


Fig. 2.



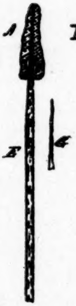


Fig. 3.

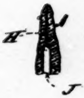


Fig. 4.

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C. M. Richmond
INVENTOR:
By Charles E. Foster
Atty.

ATTEST:
J. A. Hurdle
William Paxton.

In the application of artificial dentures it is often necessary that the part of the tooth which projects beyond the gum, or that portion which is known as the "crown," should be removed in such a way that the root may serve as a support for the artificial denture. According to the method for which I have made several applications for letters patent, the said artificial denture is supported upon a cap surrounding the root and inclosing it below and to a certain extent beneath the gum. My present improvement has especially reference to a method of preparing the roots for the application of such cap; but it is equally applicable to the preparation of roots for any other suitable support for artificial dentures.

The present method is particularly applicable to single-root teeth, and it enables the operator not only to externally prepare the root for the reception of the holding device, but to also so treat the root as to entirely prevent or greatly lessen any danger of subsequent irritation, which might otherwise produce abscesses or similar disorders.

I have discovered that by the method which I shall hereinafter describe, the tooth-crown can be removed in many cases painlessly, and in those cases in which some pain might be felt I propose to use a method of freezing the teeth, which will form the subject of a separate application for letters patent.

In carrying out my method practically I first cut horizontal grooves through the enamel of a tooth, opposite each other, one on the face of the tooth next to the gum and the other on the palatine wall of the tooth. These grooves are preferably cut by means of a rapidly-revolving corundum dental disk or wheel; but I do not limit myself to this method. These grooves prevent the splitting of the crown in the subsequent operation, and likewise afford a guide for the cutting-tool. I thereafter apply the cutting-edges of a pair of excising-forceps to the grooves already cut and quickly sever the crown from the root, leaving the nerve bare. In some instances the nerve follows the crown on its removal. This operation seems to paralyze the pulp or nerve, driving the blood therefrom and benumbing it. I then provide a suitably-shaped piece of wood, which should be cut to correspond generally to the shape of the nerve-cavity or pulp-canal. This wood should be of a soft and easily compressible nature. I find the so-called "orange-wood" well adapted to this purpose. The wood so shaped I drive at a single blow to the apex of the root, severing the pulp at its foraminal construction, and in many instances forcing it out of its cavity toward the mouth by displacing it. I then remove the wood and carefully cleanse the pulp-canal with cotton saturated with carbolic acid or other antiseptic, removing, if necessary, any particles remaining of the pulp by means of a dental broach.

In order to avoid pain by treating the tooth while still benumbed and to prevent abscess or inflammation, it is very important to close the pulp-canal immediately. This I accomplish by driving a second piece of wood, shaped like the first, into the pulp-canal in the presence of carbolic acid, filling it to its apical foramen, thus perfectly excluding the air.

When the pulp-canal is so small that I cannot force a sharpened piece of wood into it, or when the pulp has become partially calcified and is still sensitive, or when there is a deposit of sensitive secondary dentine, precluding the excavation for the insertion of a pivot and a proper plugging of the end of the root, I then adopt a freezing process, using a suitable spray apparatus, and freezing the tooth and pulp immediately after cutting the grooves for breaking off the tooth. I can then drill out what remains of the partially-calcified nerve or pulp with out causing pain, and I then proceed to plug the teeth according to the method hereinbefore described.

In practice, for the reception of my artificial denture to which I have previously referred, I generally drill out the lower portion of the tooth, making a cylindrical cavity larger than the nerve-canal.

My invention will be readily understood by the accompanying drawings, in which similar letters refer to similar parts.

Figure 1 represents an elevation of the crown and root, showing the corundum disk in process of grooving the same. Fig. 2 shows the forceps in position before the crown is removed. Fig. 3 shows the operation of driving out the pulp, and Fig. 4 shows the prepared root.

Similar letters refer to similar parts in all the figures.

A represents the root, and B the crown before removal.

C represents the grooves, and D the corundum disk.

E represents the suitably-prepared piece of wood for driving out the nerve, and G represents the nerve or pulp driven out.

H represents the subsequent wood filler, filling the upper part of the nerve-cavity; and J represents the lower portion of the root suitably drilled for the pin or other attaching contrivance.

In Fig. 1 is shown the operation of grooving the tooth between the root and crown. One groove has already been cut and the disk is shown cutting the other.

In Fig. 2, the grooves having been cut, the forceps is shown as applied. By these forceps the crown is removed, and a suitably-shaped piece of wood having been prepared, it is shown in Fig. 3 as driven up to the apical foramen of the root. This operation expels the nerve-pulp. Thereafter the permanent wood filler is driven into the nerve-cavity, as shown in Fig. 4, and, if desired, the lower part of the pulp-cavity is enlarged for the purpose of receiving some attaching contrivance. Whether or not the tooth is to be frozen depends upon its character, and in general I do not recommend this process. There are, however, certain peculiar cases where it is necessary.

What I claim as my invention, and desire to secure by letters patent, is—

1. The process of preparing roots for the reception of artificial dentures, which consists in grooving the same by opposite grooves, and then suddenly removing the crown from the root by a suitable forceps, substantially as described.

2. The process of preparing a root for the reception of an artificial denture, which consists in removing the crown from the root by a

suitable contrivance, and then immediately expelling the nerve from its cavity by driving a suitably-shaped piece of wood into the nerve-cavity, substantially as described.

3. The process of treating and preparing the roots of teeth, the same consisting in suddenly expelling the nerve from its cavity, as set forth, and then instantly filling the nerve-cavity with a wooden plug, substantially as set forth.

4. The process of preparing a root for the reception of an artificial denture, which consists in removing the crown, and then driving into the nerve-cavity a suitably-shaped piece of wood, in removing the same and cleansing the nerve-cavity, and in immediately plugging or filling the upper part of the nerve-cavity by driving in another piece of wood, substantially as described.

CASSIUS M. RICHMOND.

Witnesses:
OTTO BAUMANN.
WILLIAM PAXTON.

81 Circuit Court of the United States for the District of Connecticut.

International Tooth Crown Company
vs.
Edward S. Gaylord and J. L. Williams.
} In Equity.

82 Testimony taken on the part of defendants for final hearing before John W. Ripley, special examiner (by consent), under the 67th rule in equity, as amended, and pursuant to the annexed notice.

New York, Thursday, *May* 28, 1885.

Present: S. J. Gordon, Esq., on behalf of defendant- and George T. Curtis, Jr., Esq., on behalf of complainant.

Cassius M. Richmond, being called and duly sworn as a witness, deposes and says as follows:

1 Q. What is your name, age, residence, and profession?

A. Cassius M. Richmond; forty years of age; residence, New York city; and a dentist by profession.

2 Q. Where were you educated as a dentist, and where and when did you commence practice?

A. Philadelphia Dental College. I practised dentistry after that in Garrettsville, Ohio. I stayed there until 1874 or 1875. I next went to San Francisco, and stayed there until the fall of 1878, when I came to New York.

3 Q. About when and where did you commence experiments in fitting a gold collar about the neck of a tooth root?

Objected to as incompetent and immaterial.

A. In the city of San Francisco, in 1875 or 1876.

4 Q. Please look at the copies of letters patent now shown you,

Nos. 277,938, 277,941, and 277,943, and state when and where you first practically exercised the inventions therein described.

Objected to as incompetent and immaterial, and on the ground that the defendant Cassius M. Richmond, being the assignor to the complainant herein by mesne assignments, cannot be heard to impeach his own patent; and is further estopped by reason of the license heretofore taken.

A. 277,941 and 277,938—I made those two operations of everything described in both of those patents in San Francisco, in the mouth of Rev. Isaac H. Kalloch, on Christmas day; I think the year was 1876.

83 277,943 was first shown to me by Dr. George W. Lawrence, at Chicago, in the year 1878. The month I cannot remember, but it was in the fall of 1878. I mean the invention therein described, in patent No. 277,943.

5 Q. What success attended the operation in the mouth of Rev. Isaac H. Kalloch?

Same objection.

A. I never heard any complaint from the operation. As far as I know, it is in successful operation to-day.

6 Q. From and after the date of that operation, to what extent and where did you continue to exercise and employ the inventions described in letters patent 277,938 and 277,941? State quite fully, if you please.

Same objection.

A. I practised that operation extensively in San Francisco, Chicago, Detroit, Cleveland, New York, and New London, Conn., and I demonstrated it to five hundred dentists in private practice and in public clinics. That was in the years 1878 and 1879.

7 Q. And as to the invention described in No. 277,943?

Same objection.

A. I demonstrated this invention to a large number of dentists, including Dr. A. L. Northrop, Dr. J. P. Hodson, Dr. E. S. Gaylord, and many others. That was in the years 1878, 1879, and 1880. I performed this operation in the mouth of Dr. J. G. Mills, of 45 West Thirty-first street, New York city; also in the mouth of Dr. E. S. Gaylord, New Haven, Conn. I think I did both of these operations in the year 1880.

I told Dr. L. T. Sheffield, in the presence of J. L. Williams and George A. Mills, the source from which I obtained this information before Dr. L. T. Sheffield applied for the patent.

8 Q. At whose instance and at whose cost were letters patent 277,938, 277,941, and 277,943 applied for?

Objected to as immaterial.

A. Dr. Lucius T. Sheffield.

9 Q. What knowledge and information, if any, had he, before the

84 applications were made, of the facts hereinbefore stated by you, as to the exercise and manifestation by you of the inventions described in 277,938 and 277,941?

Same objection as to question 4.

A. Dr. Sheffield knew how long these operations had been in use. I had shown him an operation made by me in the mouth of a San Francisco lawyer by the name of R. B. Saffold that I think had been in use four years or thereabouts before such operation was shown to Dr. Sheffield and before the patent was applied for. This operation covers letters patent Nos. 277,938 and 277,941.

Mr. Saffold told Dr. Sheffield himself how long it had been in use. This operation included the four superior incisors.

10 Q. Please state what you know of Dr. Lucius T. Sheffield's having access to the originals of certain letters forming part of an article published by him in the New York Times January 14, 1883, a copy of which is now shown you, and state what, if anything, you know of the giving of such letters by the parties purporting to have signed them and state the profession of the signers.

Same objection as to question 8.

A. Dr. Sheffield had possession of the autograph letters of M. B. Cleveland, a dentist in Chicago; A. W. Freeman, a dentist in Chicago; W. A. Stevens, a dentist, of Chicago; T. W. Brophy, a dentist, of Chicago; George R. Thomas, a dentist, of Detroit; George S. Allen, a dentist, of New York city, and J. G. Ambler, who was a dentist in New York; he is lately deceased.

11 Q. Who procured those letters, and when and under what circumstances?

Same objection.

A. Some were procured by my brother and some by myself. They were given by the parties after clinical demonstrations of the crown operations described in letters patent Nos. 277,938 and 277,941.

CASSIUS M. RICHMOND.

Counsel for the defendants now offers in evidence the printed article referred to in the two previous questions, with the statement that the words "Times, January 14, 1883," and the dates of the several letters in ink were made by himself from an original copy of the Times newspaper of that date and the originals of the letters before him at the time the dates were written on the printed copy by him. 85

He will endeavor to procure a copy of the Times of January 14, 1883, and the originals of the letters, if it is desired.

Said article is now marked "Defendants' Exhibit New York Times."

"Defendants' Exhibit New York Times" objected to as immaterial and incompetent.

"DEFENDANTS' EXHIBIT NEW YORK 'TIMES.'" J. W. R., Ex'r.

Times, January 14, 1883.

A Breeze that will Revolutionize the Practice of Dentistry—Progressive Energy and Genius versus Professional Pride and Musty Ethics.

During the past few weeks several articles have appeared in the newspapers of this city, and in one instance in a cheap publication which purports to be "devoted to the dissemination of scientific knowledge specially connected with dentistry," which, to a greater or less extent, are calculated to prejudice the public mind concerning the Richmond Tooth Crown Co. So long as these public and private attacks were of a personal nature, giving evidence only of that jealousy which always manifests itself when an unusual success rewards the energy and ability of some one who has dared step a little aside from the ancient way of doing things, we regarded them as unworthy of notice and therefore passed them by in silence. But, thanks to the persistent efforts of some of our contemporaries in this city, the subject has become one of public interest, and we now propose to say a few words concerning our own business and its relation to the general practice of dentistry, and in so doing we shall present some facts for which we shall probably receive more gratitude from the public than from the profession as represented in this city. We say this city for it is a remarkable fact that outside of New York and its immediate vicinity the dental profession are eager to
86 adopt our new methods of practice and admitting them to be
greatly in advance of anything heretofore offered for the restoration of lost or badly decayed teeth. It is also worthy of note that in all of these articles there is no mention of our greatest and most valuable invention, viz., our crown extension or bridge-work, by means of which a full set of teeth may be inserted, without a plate, upon three or four firm, healthy roots. Neither is there any criticism on the quality of our work. It is everywhere pronounced beautiful beyond anything heretofore produced in mechanical or operative dentistry. What, then, is the occasion of all this vituperation and personal abuse? We have by advertising violated that ancient, long-venerated relic of barbarism, the code of ethics. We have informed the public in the fewest possible words just what we have and just what we can do, and as this is not in accordance with the above-mentioned deservedly obsolete document, therefore the anathema has been pronounced against us.

Let us examine a little the spirit and purpose of this so-called "code of ethics." Webster defines the word "ethics" as "the science of human duty;" but certain dental functionaries, whose success in practice depends upon a suppression of everything which tends to stimulate or foster inventive genius or business energy, would insist that the term "dental ethics" should be made to signify the duty which the young, liberal, and progressive element in the profession owe to them, and that this duty consists in the avoiding of all words and actions which tend to give the public an impression that they

are capable of making any improvements upon their old methods of operating. "It is unprofessional," says the code of ethics, "to resort to public advertisements, cards, hand-bills, posters, or signs, calling attention to peculiar styles of work, lowness of prices, or special modes of operating." There has been perfected in our institution during the past two years an invention which is capable of doing more for humanity in alleviating suffering and bringing comfort to those who are afflicted with unhealthy mouths and diseased dental organs than all other operations in dentistry combined. If we had given the public no information concerning this work how would it have been possible that eight thousand of these beautiful operations should have been performed during the past year? We have violated the "code of ethics" by advertising. Why did we advertise? Because it was the only way in which we could bring before the public an invention which is an advance of
fifty years at one step in the practice of dentistry and an in-
87 vention against which the profession have brought no criti-
cism except that it requires too great a degree of skill on the part of the dentist to successfully perform this operation. When the members of the dental profession supposed that they were to gratuitously receive the benefits accruing from years of untiring labor and patient experiment and the expenditure of thousands of dollars they endorsed this work as no other invention in dentistry has ever been endorsed. But now that we ask a reasonable sum for the privilege of using our new inventions they reply, not by condemning the work, but by resorting to a despicable tirade of personal abuse.

We present below a few extracts from letters and the reports of the meetings of dental societies. The letters are a few selected from hundreds which have been written by the most eminent dentists in the profession. The public should keep in mind the fact that these endorsements were written when some of our more recent and most valuable inventions had not been thought of, and all of our work has been brought to a much higher degree of perfection since that time. The originals are in our possession and can be shown any one who may desire to see them.

In the Dental Cosmos for May, 1879, is a report of the meeting of the New York Odontological Society, at which meeting Dr. N. W. Kingsley said: "An interesting operation was performed in my office a day or two since by Dr. Richmond.

"The case was a broken-down bicuspid upon the left side of the upper jaw of a young lady who had been a patient of my brother in Paris.

"The external half of the tooth had split off, and a portion of the inner cusp was also gone, and my brother had replaced it with a porcelain face made of a plate tooth, to which was soldered a pivot going up into the root, and the space inside the porcelain filled with amalgam.

"It had loosened in time, and she came to me to have it reset.

"As it was an excellent case upon which to demonstrate Dr. Richmond's plan, I called him in, and the result was one of the prettiest

operations I ever saw. * * * Dr. Richmond assures me that in the mouths of his patients they have remained unchanged for years, and I can see reasons why they ought to be much more du-
88 rable than pivot teeth set in the ordinary way. As a nice piece of mechanism they are certainly perfect."

At the same meeting Dr. Frank Abbott said, after speaking of the difficulty which he had experienced in attempting to secure the services of Dr. Richmond to perform an operation for him, and which he had at last been compelled to attempt himself: "I do not wish, however, to be understood as attempting to steal any of Dr. Richmond's thunder. His is a very pretty and certainly useful operation, and he is entitled to all the credit for its introduction."

Letters of Introduction and Endorsements of the Richmond Tooth Crown, Signed by Some of the Most Eminent Men in the Dental Profession.

September 23, 1878.

CHICAGO, ILL.

DEAR SIR: After having you mount two crowns in my office, I emphatically pronounce it the finest thing in dentistry I have ever seen or heard of. No dentist should fail to have your method of mounting crowns.

Truly and cordially, L. EATON.

May 2, 1879.

CHICAGO, ILL.

I have used Dr. Richmond's new method of mounting crowns for six months past in fifty cases, the roots of many of which I had considered worthless before this new invention. It is, doubtless, the most remarkable benefit to the dental profession that has been introduced for many years.

M. B. CLEVELAND.

October 13, 1879.

NEW YORK.

DEAR SIR: This will introduce to you my friend, Dr. C. M. Richmond, who is a specialist, which specialty he will explain to you, and I can fully endorse what he can show you in his own mouth, having a specimen of his handiwork in my own mouth, which is as perfect as anything artificial can be.

Sincerely yours, J. G. AMBLER.

89 September 9, 1878.

CHICAGO, ILL.

DEAR DOCTOR: "I came, I saw," but you conquered. Your setting of gold and porcelain crowns, for beauty, cleanliness, and durability, have no equal. I rejoice in this invention of yours, which enables us to so completely restore failing teeth to fallen humanity. It is worthy, and writes you the noble name of benefactor.

Cordially yours, A. W. FREEMAN.

September 5, 1878.

CHICAGO, ILL.

Dr. C. M. Richmond:

DEAR SIR: Allow me to express to you my best feelings for the opportunity of seeing you operate in setting crowns of teeth by your method. Judging from all I saw, it is the "*ne plus ultra*" of placing crowns on the roots of teeth, and every dentist should be possessed of the knowledge of how to perform it if he wishes to benefit the human family as well as himself.

Yours truly, W. A. STEVENS.

NEW YORK.

MY DEAR DOCTOR: This will introduce to you *in propria persona* Dr. Richmond, of new process pivot-work and artificial crown notoriety. I bespeak for him your favorable consideration and attention. For myself, I am a most ardent believer in the great value of his inventions, and I am quite certain you will join hands with me so soon as you have a fair opportunity of judging of their merits. In my own mouth I have two most comfortable specimens of his handiwork. Hoping soon to have the pleasure of seeing you,

I am, most truly, yours, GEO. S. ALLAN.

September 12, 1878.

CHICAGO, ILL.

C. M. Richmond, D. D. S.:

DEAR SIR: It affords me great pleasure to say that your method of mounting artificial crowns is, in my opinion, a grand success.

An examination of these crowns, and a knowledge of how they are constructed and adjusted, will convince the most skeptical
90 practitioner that this is an improvement of true merit.
Teeth which have been considered irretrievably lost can be restored by this method to usefulness; especially is this applicable to bicuspids and molars. The roots are protected from the advancement of caries, and by retaining them the contour of the features is preserved. In short, cleanliness, durability, and strength are combined with the highest type of artistic beauty. A knowledge of this method is indispensable to the practitioner of progress who desires that his patients shall receive the benefit of one of the greatest improvements in modern dentistry.

T. W. BROPHY, D. D. S.

October 29, 1878.

DETROIT, MICH.

MY DEAR DOCTOR: This will introduce to you Dr. C. M. Richmond, of San Francisco, who has been engaged for the last few days in placing before the dentists of Detroit a method of operating upon old and seemingly worthless roots that to me is decidedly new, although it may not be to you. But, whether new or otherwise, it, to my mind, is one of decided merit, and I am sure will command, upon investigation, your hearty endorsement. To me it has opened up a new field in the possibilities of dentistry. Among other operations the doctor has performed here is one in my own mouth, a superior second molar, that I have regarded of doubtful value for more than fifteen years, but now I am of the opinion that it will serve me a most excellent purpose for the remainder of my life. Hoping that you may give Dr. Richmond, whom we have found to be a very courteous and agreeable gentleman, a welcome hand and a warm heart, and that you are very well and happy,

I remain, truly and fraternally, G. R. THOMAS.

The above is a short chapter from the record of the profession concerning the merits of the Richmond tooth crown. We could occupy the entire space of this paper with letters of this character.

The dentists of New York city do not need to be reminded that
they have endorsed this method of work as highly as it has been
commended elsewhere, and their glowing encomiums will
91 make interesting reading in connection with their present
actions. The Richmond tooth crown and bridge-work has
come to stay.

L. T. SHEFFIELD,
Manager Richmond Tooth Crown Company, No. 26 West 32d St.

Adjourned until Thursday, June 4, 1885, at 11 o'clock a. m.

THURSDAY, *June* 4, 1885—11 o'clock a. m.

Present: S. J. Gordon, Esq., and the witness, C. M. Richmond.

12 M.

Adjourned until 2 o'clock p. m. and notice sent to complainant's counsel.

2 O'CLOCK P. M.

Present: S. J. Gordon, Esq., George T. Curtis, Jr., Esq., and the witness, C. M. Richmond.

Adjourned to June 6, 1885, at 11 o'clock a. m., for direct examination of witnesses for defendant-, reserving the rights of objection and cross-examination.

The cross-examination of witness, C. M. Richmond, is adjourned to Wednesday, June 17, 1885, at 11 o'clock a. m., with the understanding that it shall then be proceeded with or his examination closed.

WEDNESDAY, *June* 17, 1885—11 o'clock a. m.

Present: Counsel as before.

By mutual consent the examination is now adjourned to Friday, June 19, 1885, at 11 o'clock a. m.

92 FRIDAY, *June* 19, 1885—11 o'clock a. m.

Present: S. J. Gordon, Esq., on behalf of defendants, and E. N. Dickerson, Jr., Esq., on behalf of complainant.

Cross-examination of CASSIUS M. RICHMOND by E. N. DICKERSON, Jr., Esq.:

12 X Q. Who is paying the expenses of this litigation on the part of the defendants?

A. I do not know that any one has paid a cent except myself and my brother.

13 X Q. Have you any information whatever in that regard?

A. None.

14 X Q. Have you any information concerning an association formed for the purpose of contesting the complainant's patents relating to artificial dentures?

A. None.

15 X Q. Have you ever heard of the Dental Protective Union?

A. I have.

16 X Q. Were you ever present at a meeting of that union?

A. Never.

17 X Q. What information have you concerning this union and its purposes?

A. I know nothing of it, except that I have been informed that there was such an association, and that Dr. Dwinelle was its president, and that it was formed many years ago for the purpose of protecting the dental profession against the Goodyear Dental Vulcanite Company.

18 X Q. The purpose of this organization, as you are informed, was to contest the validity of patents in the interests of the dental profession, was it not?

A. I know nothing further in regard to this company than stated in my previous answer.

19 X Q. Are you the patentee named in letters patent of the United States granted to C. M. Richmond February 10, 1880, No. 224,355?

A. Yes, sir.

20 X Q. When did you practise the operation therein described for the first time?

A. I cannot remember.

21 X Q. In whose mouth did you first place that operation?

93 A. That I cannot remember.

22 X Q. How many times did you practise that operation?

A. It is impossible to tell.

23 X Q. Can you state approximately?

A. No, sir.

24 X Q. Can you state within a hundred?

A. No, sir.

25 X Q. Previous to coming to New York and going to Dr. Sheffield were your tooth-crown operations all of the same character.

Counsel for complainant, being of the opinion that the direct examination of this witness was plainly incompetent, proceeds to cross-examine him *de bene esse* only, the said cross-examination to stand or fall with the direct.

A. Pretty much.

26 X Q. If there was any difference of detail, will you be good enough to state that fully?

A. Sometimes they were done in one way and sometimes in another.

27 X Q. How many ways in all?

A. Sometimes the teeth were backed with gold, sometimes with platina; sometimes the crowns were entirely made of platina, except the solder and porcelain.

28 X Q. Excepting, however, in the variations of the material you have named, they were otherwise made the same in structure as I now understand you, were they?

A. Pretty much the same in their general characteristics.

29 X Q. Taking the Kalloch operation as an example, would that have been a fair representative of what you were doing before the time you joined with Dr. Sheffield?

A. Yes, sir.

30 X Q. Will you describe that operation somewhat in detail?

A. That operation was a band surrounding the root, with a porcelain front, a pin extending into the root, the whole cemented on the root in one piece.

31 X Q. How was the band or ring made to fit the root?

A. It was made with a piece of gold-plate material soldered together to form a solid ring.

32 X Q. You fitted that band around the end of the root in Mr. Kalloch's mouth?

94 A. Mr. Kalloch's mouth.

33 X Q. Then, after you had fitted that there as well as you could, please describe what you next did.

A. Ground a porcelain on this band to correspond with the adjoining tooth; bevelled the edge till I had it to correspond as near as it could be. It was then waxed into this band, a pin was inserted, and it was invested.

34 X Q. The bevelling you refer to was done on the upper edge of the tooth crown, was it?

A. On the facial surface.

35 X Q. Will you describe, so that the court may understand, what you mean by facial surface?

A. That is the surface looking from the face into the mouth. That is an expression used in dentistry.

36 X Q. Do you mean, then, that the bevelling was done on the outside of the porcelain—that is, the part of the porcelain that is visible?

A. No, sir. The bevelling was done on that portion of it that went and come into contact with the band.

37 X Q. You would say, then, that the bevelling was done on the inner surface of the upper part of the porcelain?

A. Yes, sir.

38 X Q. Now, having bevelled that part of the porcelain, what did you next do with relation to bringing the porcelain into proper relations with the band?

A. The tooth was then waxed into its position. It was first ground to its proper position on the band. The band was then removed, and the porcelain was waxed into its position on the band, the same position which it occupied after I had fitted it in the mouth.

39 X Q. After you had so waxed the porcelain what was the next operation which you did?

A. The pin was then inserted into the wax forming the crown, the band, porcelain, and pin being held together with wax. It was then invested—marble dust and plaster were the investing material—leaving only the wax surface exposed. The wax was then removed, and that portion of it that was filled with the wax before was filled with gold, forming one solid crown.

40 X Q. How was that filled with gold.

A. Blow-pipe. It was filled by heating it very hot and flowing gold into that position which had been occupied by the wax.

95 41 X Q. Have you now described everything that was done in carrying out that operation?

A. Described it as well as I can.

42 X Q. I am asking whether, at the present time, you recollect doing anything further in making the combined denture consisting of the gold and porcelain than what you have already described?

A. It was then cemented on to the root after being polished.

43 X Q. Now, you have made some reference to an operation in the mouth of Judge Saffold; was that of the same nature?

A. Yes, sir.

44 X Q. Did you ever do anything to that operation after it was originally placed in Judge Saffold's mouth?

A. Yes, sir.

45 X Q. Where did you do that and what alteration did you make?

A. I did that in the city of New York. There were in this operation the four superior incisors. I removed those teeth in the city of New York and replaced them with four new ones, adding two more to the operation—making the six superior front teeth.

46 X Q. Do you know what became of that original operation?

A. I do not. I always supposed that Dr. Sheffield had it until he told me that he did not, and was looking for it one day, and I never knew what became of it. It was around the office there for many weeks.

47 X Q. Now, what difference was there in this operation after you had replaced it?

A. It was removed for the purpose of carrying the porcelains nearer to the gums, so that the gold band would not show on the facial surface.

48 X Q. According to the operation as you were then making it at Dr. Sheffield's, the gold band was so arranged with reference to the porcelain as that the gold surface should be substantially concealed beneath the gum, as I understand it?

A. Yes, sir.

49 X Q. I observe in patent 277,941 that, in order to accomplish

that result, you make a bevel on the front of the band. Did you make that arrangement first in the new operation for Judge Saffold?

A. Yes, sir.

50 X Q. Did you ever carry out at all the operation of your first patent of 1880, to which we have made previous reference?

A. Very seldom.

96 57 X Q. Did you ever do it?

A. With the exception that the band was carried down around the root, I have in a limited number of cases in the city of New York that are in wear—one that I can remember.

52 X Q. That, then, was another kind of operation, which you were sometimes performing before you went with Dr. Sheffield?

A. I performed that sometimes; yes.

53 X Q. Now, did you make any tooth-crown operations in which porcelain was not employed as a surface—I refer to entire gold crowns?

A. Yes, sir.

54 X Q. Can you name any instances where you performed that operation prior to your coming with Dr. Sheffield?

A. Yes, sir; I made gold crowns extensively—entire gold crowns; also platina crowns—entire platina crowns.

55 X Q. I ask if you could name any special instance where you did that work?

A. I don't think of any now.

56 X Q. In regard to the operations which you made previous to coming with Dr. Sheffield, can you state approximately how many of these were successful—I mean whether it was not the fact that many of these operations, after having been placed in situation, required subsequent attention?

A. They did.

57 X Q. Did you make the operation "Exhibit Imlay Tooth?"

A. I did.

58 X Q. Now, was that tooth made in the same way as the operation which you have described with reference to Mr. Kalloch?

A. No, sir; there was a screw soldered into this instead of a pin.

59 X Q. With that exception, is it like the other operation?

A. I should think it was substantially the same. As near as I can remember, it is substantially the same operation.

60 X Q. You have spoken of an operation shown you by Dr. Lawrence. Will you describe exactly what that operation was as it was shown to you?

A. That operation was cutting off a tooth and destroying the nerve alive with a blow—destroying the nerve while it was in its live condition by a blow of the mallet and a stick of wood whittled to conform to the shape of the cavity occupied by the nerve.

61 X Q. That was all that was shown you by Dr. Lawrence, as I understand?

97 A. Yes, sir.

62 X Q. I suppose in your conversation with Dr. Sheffield, if you made any reference to this Lawrence matter at all, it was in substantially the way that you have described it to me?

A. Yes, sir.

63 X Q. Now, sometimes, in placing the artificial porcelains in position in connection with the bands, did you fill in the gold behind the porcelain in the mouth, or was that invariably done outside?

A. That was invariably done outside with the blow-pipe.

64 X Q. You remember no instance in which you filled the gold up into the root in connection with an artificial porcelain face?

A. No; that is, with the one exception of gold crowns I never did that, and never knew of its being done. In my practice I used to take gold bands and put them on the roots, and then fill in top with gold-foil, making a solid gold crown in that way.

65 X Q. Do you mean that you placed your band upon the root and then filled in from beneath, so building up the gold crown?

A. Yes, sir.

66 X Q. Was that your invariable method in connection with gold crowns?

A. No, sir.

67 X Q. What other method did you sometimes follow?

A. After making the gold band I soldered the crown on top of that, finishing it entirely before inserting it.

68 X Q. Under those circumstances how did you make your gold crown so as to get the proper shape and articulation?

A. I used to first fit the gold band to the root, getting the proper length while in the mouth, and then removing after cutting it to the right length, soldering on a gold top either of solid gold or a swaged top.

69 X Q. Then did you fill in outside of the mouth the inside of the band above the articulating surface?

A. With solid gold before putting it on the root?

70 X Q. Yes, sir.

A. Yes, sir.

71 X Q. Will you be good enough now to name all the operations previous to December, 1880, in which you applied a porcelain face to a tooth crown? I mean the names of the individuals and where the operation occurred. I ask only for such names as you can remember.

98 A. I cannot recall the names of any of these people that I operated for, at the present time.

72 X Q. Now, can you remember any other changes beside the bevelling of the front of the gold band and the raising of the gold band beneath the gum in the alteration which you made in Judge Saffold's case?

A. The difference in the pin was this: in the first operation, that was made so many years ago, the pin was a hollow tube. In the operation as it was replaced the pins, I think, were square pieces of wire.

73 X Q. In making that new operation in Judge Saffold's mouth, do you remember whether you did not further make the improvement of cutting down on the sides of the ferrules, so that these bands

would not interfere with the Alveola process on the sides of the roots?

A. Yes, sir; and another thing in regard to that other question, in regard to that crown of Saffold's: I think, as the original was, there was no bevel between the porcelain and the crown when it was right straight across.

74 X Q. I now show you a tooth crown fitted to a root. Would you say that was a fair representation of all the tooth-crown operations which you performed prior to 1881, independent of the question of whether you employed a wire pin or tube pin?

A. Yes, sir.

75 X Q. Do you recollect whether you were using any of the solid pins like that shown in the exhibit just shown you previous to going with Dr. Sheffield?

A. I know I never used anything like that—square wire.

Complainant's counsel offers the tooth crown referred to by the witness in evidence and marks it "Exhibit Richmond Old Operation."

76 X Q. Previous to going with Dr. Sheffield and previous to 1881, was not your method of proceeding in making these tooth crowns as follows, invariably, so far as you now recollect: In the first place, to take a cast in hard wax of the root in the mouth, then to fill the impression of the root with plaster and fit upon that plaster the ferrule or band which was to become part of the finished tooth crown?

99 A. Yes, sir.

77 X Q. Is there any other alteration in regard to the method of attaching the porcelain to the band which you originated after coming with Dr. Sheffield and which you can explain?

A. I used to invest the band with the investment material previous to adjusting the porcelain in its position.

78 X Q. In the subsequent operations that step was omitted and the porcelain was simply waxed to the gold?

A. Yes, sir.

79 X. Q. Are "Exhibit Imlay Model" and "Exhibit Richmond Old Operation" the same operation, with the exception that in one case a solid pin is used and in the other a hollow tube for the pin?

A. Yes, sir.

80 X Q. At the time that your brother and yourself were working together, and during the time of the alleged infringements here, was his compensation a percentage of the operations?

A. No.

81 X Q. What was his method of compensation?

A. He took whatever he liked.

82 X Q. The fact is, then, that you and your brother would take, under the circumstances, such parts of the money as came in as happened to come to your hands, was it?

A. He took such money as came into his hands, and I took the rest.

Complainant's counsel offers in evidence a model, which he marks "Exhibit Richmond Sheffield Operation."

83 X Q. Please look at the model now offered in evidence and state whether that was one of the operations made by you and given to Dr. Sheffield while you were in connection with him, some time in the year 1881 or 1882.

A. Yes, sir.

Complainant's counsel offers in evidence a model, which he marks "Complainant's Exhibit Richmond Model No. 2."

84 X Q. Please look at the model now shown you and state
100 whether that is a representation of the kind of tooth crown
which you were making in November and December, 1883.

A. Yes, sir.

CASSIUS M. RICHMOND.

Subscribed and sworn to before me this 24th day of June, 1885.

[L. S.] JOHN W. RIPLEY,
Notary Public, New York Co.

Adjourned until Monday, June 22, 1885, at 11 o'clock a. m.

NEW YORK, SATURDAY, *June* 6, 1885—11 o'clock a. m.

Present: S. J. Gordon, Esq., for defendants, and George T. Curtis, Jr., Esq., for complainant.

ALVAN S. RICHMOND, being called and duly sworn as a witness, deposes and says as follows:

1 Q. What is your name, age, residence, and profession?

A. Alvan S. Richmond; age, forty-one years; residence, New York city; and a dentist by profession.

2 Q. Please look at the copies of letters patent Nos. 277,938, 277,941, and 277,943, and state when and where you first practically knew of the inventions therein described.

Objected to as immaterial and incompetent.

A. Some time in September, 1878, I became acquainted with the processes described in said letters patents.

3 Q. Where was it and in what way? State the circumstances.

Same objection.

101 A. My brother, Dr. C. M. Richmond, came to Chicago from
San Francisco about the middle of August, 1878, to teach to the dentists what he claimed as his method of setting gold and porcelain faced crowns upon natural roots of teeth.

I assisted him in arranging for clinics to demonstrate to the dentists substantially what is described in letters patent Nos. 277,938 and 277,941. What is described in letters patent No. 277,943 was substantially learned by my brother and myself in the office of Dr. George W. Lawrence in the month of October, 1878, in an operation in my own mouth on the superior left central incisor. The excising of the tooth and expelling the nerve with a suitably shaped piece of wood and of filling the nerve cavity in the manner described in said patent was done by Dr. George W. Lawrence, and a crown attached thereto by my brother as described in letters patent No. 277,941.

4 Q. From the fall of 1878 state what you know of the practical application of the inventions described in said patents by Dr. Cassius M. Richmond and others.

If intended to invalidate letters patent therein referred to, objected to on the same ground as question 4 in the direct examination of C. M. Richmond.

A. The operations as performed by my brother in Chicago, St. Paul, Milwaukee, Grand Rapids, Michigan, and Detroit were successful and met with the highest approval from members of the dental profession. I practised the same operations successfully afterwards in the cities of Indianapolis, Cincinnati, Louisville, Columbus, Toledo, Pittsburgh, Baltimore, Washington, D. C., Philadelphia, Albany, Troy, Rochester, Buffalo, Fort Wayne, Ind., Terre Haute, St. Louis, Springfield, Ill., Madison, Wis., Chicago, Toronto, Can., St. Catherine's, Can., Hamilton, Can., and New York city, whither I came to reside in August, 1881.

5 Q. At whose instance and at whose cost were letters patent Nos. 277,938, 277,941, and 277,943 applied for, if you know?

Objected to as immaterial and incompetent.

A. By the Richmond Tooth Crown Company or L. T. Sheffield; I believe the Richmond Tooth Crown Company. The incor-
102 porators were Lucius T. Sheffield, Washington W. Sheffield, and William A. Lyon. Dr. Lucius T. Sheffield was secretary and treasurer.

Objected to as irresponsive, and, further, on the ground that proof of the incorporation of the company cannot be formed by parole, there being better evidence accessible.

6 Q. What knowledge or information, if any, had Dr. Lucius T. Sheffield, before said patents were applied for, of the facts hereinbefore stated by you as to the exercise and manifestation of the inventions described in said letters patent, and how do you know?

Objected to on the same ground as question 4.

A. From daily operations in the office at 26 West Thirty-second street, New York city; from repeated conversations and talk with him about the work; from work he saw in the mouth of a Mr. R. B. Saffold—four upper incisor teeth that were placed there by my brother, Dr. C. M. Richmond, in the city of San Francisco nearly a year, I think, before my brother left for the East; from various letters commending the merits, given at different times by dentists after learning and seeing the work, dating as far back as September, 1878.

7 Q. What information, if any, did you give him, before said pat-

ents were applied for, of what you have stated was done in the way of the use of the inventions therein described before you came to New York city?

Same objection.

A. I showed Dr. Sheffield my personal letters of recommendation from a large number of dentists for whom I had worked. I told him of my and my brother's doing the work in different cities, and when he talked about patents I discouraged the idea, from the fact of their having been used so long, and that I did not think the dentists would ever submit to another experience like what they passed through in the Goodyear suits.

8 Q. At the end of an article purporting to have been published in the New York Times January 14, 1883, are eight letters. What do you know of the giving of the originals of said letters, and are the dates thereof correct, and if you have the originals will you produce them for verification?

Objected to as immaterial and incompetent.

103 A. Dr. M. B. Cleveland's letter, dated Chicago, Ill., May 21, 1879, was given to me. The others were given to my brother, Cassius M. Richmond. The dates are all correct except that of Dr. Cleveland's, which is printed May 2, and should be May 21, 1879. I have the originals and now produce them.

9 Q. Please look at the thirty-one other letters now handed you and state what you know about them.

Same objection.

A. Twenty-one of them were given to me by the parties who signed them. The other ten are letters given to my brother, Cassius M. Richmond. The twenty-one were given to me at the time they are dated and in the places from which they are dated. I handed all or nearly all of them to Dr. Lucius T. Sheffield the latter part of the year 1882, in presence of Dr. Cassius M. Richmond, Dr. James L. Williams, and I think Dr. George A. Mills was present.

10 Q. About how long, if you know, did they remain with Dr. L. T. Sheffield?

Same objection.

A. I do not know how long they remained in his possession. When I left Sheffield's employ, March 2, 1883, I asked him for my personal letters. His answer was: He did not know where to find them at that time, but I could have them some other time.

11 Q. What do you mean by your personal letters?

Same objection.

A. The twenty-one before mentioned.

Defendants' counsel now offers in evidence the thirty-nine letters referred to in the four next preceding questions, and are marked as "Exhibit Dentists' Letters."

"Exhibit Dentists' Letters" objected to as immaterial and incompetent and further as unsufficiently proved.

12 Q. In whose mouth did Dr. Cassius M. Richmond first operate in Chicago in the fall of 1878, and what did he do?

Same objection as to question 4.

104 A. In the mouth of the daughter of Dr. John S. Marsh, a dentist. Putting on two crowns, I think; I won't be positive about it—a gold molar crown and a porcelain-face crown. By not positive I mean I am not positive about his putting on a porcelain-faced crown at that time.

13 Q. What do you know of his subsequently, and how soon thereafter, performing any operation in the mouth of Dr. Ullery, and what was it and who was present?

Same objection.

A. Two or three days thereafter he performed the operations of making and setting a porcelain-faced crown and a gold crown in the mouth of Dr. Ullery, in the office of Dr. Edgar D. Swain; present at the time was Dr. John S. Marsh, M. B. Johnson, J. S. Swartley, T. W. Brophy, M. H. Aspinwall, and one or two others whose names I do not recollect.

14 Q. What did he set the crowns upon?

Same objection.

A. Superior central incisor natural root and a second superior bicuspid.

15 Q. What similarity was there between the operation of setting the porcelain-faced crown in the mouth of Dr. Ullery and the invention described in letters patent No. 277,941?

Objected to as immaterial and incompetent, and, further, on the ground that this witness is not competent as an expert to make the comparison requested.

A. Identically the same as described in that patent.

ALVAN S. RICHMOND.

Cross-examination postponed until June 19, 1885.

Complainant's counsel consents to the thirty-one letters, not already printed, being sent to the printer without copying, and that the defendants may retain in their possession the said letters, to be produced when called for by complainant's counsel.

Adjourned until Tuesday, June 9, 1885, at 11 o'clock a. m., for direct examination, reserving rights as before.

105 EXHIBIT DENTISTS' LETTERS.

J. S. Swartley, 755 Michigan avenue.

CHICAGO, *September* 5, 1878.

Dr. C. M. Richmond, Cal.:

DEAR SIR—Since I have attended your clinic, I congratulate you on your *modus operandi;* I will say that it is the most natural and durable way of mounting roots of teeth in the mouth with gold crowns and also porcelain facings, with less pain to the patient, also less strain on the tooth or root, and better results in a shorter space of time than known heretofore in my practice.

I would not have missed your instructions for a great deal. Hoping that you may prosper and live,

Respectfully yours, J. S. SWARTLEY.

67 WASHINGTON STREET, CHICAGO, *September* 10, 1878.

Dr. C. W. Richmond:

Allow me to state that I look upon you as a benefactor not only to the dental profession, but also to all that class of people who, by the loss of teeth, are obliged to resort to artificial substitutes. Your method of mounting artificial crowns, either the porcelain-faced or of gold, is superior to anything yet placed before the profession. For durability and in securing the natural expression of features, etc., they cannot be excelled.

I remain, Doctor, very respectfully, EDGAR D. SWAIN.

174 STATE STREET, CHICAGO, *September* 10, 1878.

MY DEAR DOCTOR—Dr. C. M. Richmond, who will hand you this, has been demonstrating in this city a new method of mounting artificial crowns, new to me, and I take pleasure in giving him this letter, in order that you may, if inclined to investigate the matter, do so with the assurance that some of our best men here regard this as the most promising method yet offered. It will fully repay you to attend a clinic, if you wish to try the process, as thereby you become familiar with the manipulations at the hands of an expert.

Very truly yours, GEO. H. CUSHING.

Dr. C. D. Cook, 133 Pacific street, Brooklyn, N. Y.

106 W. W. Allport, 208 Wabash avenue.

CHICAGO, *September* 10, 1878.

DEAR DOCTOR—This will be handed you by C. M. Richmond, D. D. S., of San Francisco, California. The Doctor has been spending several weeks in Chicago, teaching many of our dentists his method of mounting the roots of bicuspid and molar teeth with gold crowns, and the roots of incisor and cuspid teeth with gold, porcelain-faced, crowns. The method may not be new to you, but it is to me, and it seems to be a great improvement over any method before in use. You will do well to look into it. Trusting that your acquaintance may be mutually agreeable,

I am, very truly yours, W. W. ALLPORT.

Office of Truman W. Brophy, D. D. S., northwest cor. State and Madison streets (rooms 5 and 6).

CHICAGO, *September* 12, 1878.

Prof. T. L. Buckingham:

DEAR SIR—This will introduce to you Dr. C. M. Richmond, of California, who will exhibit to you specimens of his process of mounting artificial crowns. It is something entirely new to me and my brother practitioners of this city. It is a great improvement over the usual method of mounting crowns; besides, bicuspids and molars, which we have habitually extracted, since their crowns have been destroyed by caries, can be equally as well restored to usefulness as the anterior teeth.

The Doctor has been engaged several weeks in this city giving clinics as well as instruction in private practice. The better class of practitioners has availed themselves of the opportunity offered to learn the process of manipulation. I heartily recommend it to you and other dentists everywhere.

Yours very truly, T. W. BROPHY.

Office of A. T. Metcalf, dentist, 103 Main street.

KALAMAZOO, MICH., *September* 13, 1879.

Dr. Richmond has been with me a couple of days engaged in restoring crowns to roots of teeth which heretofore I considered worthless, and I am so much pleased with the results of his operations and the simplicity of his method that I am forced to say every good dentist must learn his process or fall behind.

A. T. METCALF, D. D. S.

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107 Operative dentistry.—At Dr. Metcalf's office yesterday we witnessed some of the most astonishing results in dentistry that have ever come to our knowledge—the mounting of artificial crowns upon the roots of old teeth and thereby completely restoring their usefulness for a lifetime.

The inventor, Dr. Richmond, has been engaged by Dr. Metcalf to impart the secret mode of operation, and from what we saw of the work we do not hesitate to pronounce it the greatest step in advance which has been made in the profession for many years.

We were shown this morning Dr. Richmond's new process of operative dentistry—the mounting of artificial crowns upon the roots of old teeth, completely restoring them to usefulness. The process has been obtained by Dr. Metcalf, and the specimens of the work shown us this morning at his office are a convincing proof of its efficacy and value.

CHICAGO, ILL., *September* 23, 1878.

Dr. C. M. Richmond:

DEAR SIR—Allow me to express (in some measure) my admiration of your invention for mounting artificial crowns upon the roots of teeth where the crown is wasted by decay.

I think every dentist who truly wishes for the best results for his patient will not fail to avail himself of the opportunity offered for acquiring a knowledge of the process.

Yours, etc., J. A. FREEMAN.

CINCINNATI, *October* 19, 1878.

To the dental profession:

I take pleasure in recommending Dr. Richmond's method of putting on crowns of teeth when worn down by mastication or decay. An inferior bicuspid in my own mouth, capped by the Doctor, proves very satisfactory.

There are many cases such as mine where I consider the process invaluable.

Respectfully, etc., JAS. TAYLOR.

CINCINNATI, O., *October* 20, 1878.

Dr. Richmond:

DEAR SIR—I would say that I consider your process of placing entire gold crowns on roots even with the surface of the gum simply invaluable in many cases. Work that I have done having
108 a similar exterior appearance has been accompanied with so
much labor and so much inconvenience to the patient that I have doubted the advisability of performing such operations, even when receiving an extravagant fee. Your process makes a much superior crown with very little labor, and may be done profitably at a much smaller price. I see no reason why such a crown, in the majority of cases, should not last from ten to twenty years.

Yours truly, L. P. MEREDITH.

CINCINNATI, *October* 22, 1878.

To whom it may concern:

Dr. Richmond having demonstrated to me his method of mounting gold crowns, I take pleasure in saying that I regard it a very valuable mode of utilizing those roots that heretofore have been considered unavailable for pivoting.

FRANK A. HUNTER.

COLUMBUS, OHIO, *October* 31, 1878.

Gentlemen of the profession, I have taken instruction of Dr. Richmond in resetting gold crowns, and do not hesitate to say it will pay any practising dentist one hundred fold.

J. E. ROBINSON.

Dr. A. H. Brockway:

DEAR FRIEND—Allow me to introduce to you Dr. C. M. Richmond, of San Francisco, Cal.; he designs stopping a few weeks in

New York previous to sailing for Europe, where he intends to make his home for some few years. During his stay in New York he intends to demonstrate, before the dental fraternity who may desire it, his mode of restoring crowns of molars and bicuspids with gold, and the front teeth with gold and porcelain face. In his own mouth he carries such work as he has made in my office; the work you will admit to be beautiful, and you will be surprised at the simplicity with which the operations are performed. I invited ten of our best operators here to come and witness the operation, and all were highly delighted with what they saw. I cheerfully commend him to your favorable notice, and trust, should you avail yourself of instructions in this branch of the dental art, that you will be as well pleased and fully repaid for both the time and money expended as I am myself. I was sorry not to see you at Falls this last summer, but hope to have that pleasure in 1879. With kind regards, I remain,

Very truly yours, GEO. L. FIELD.

Detroit, October 31, 1878.

109 J. R. Finney, oral surgeon and dentist, manufacturer of artificial teeth, continuous gum, gold, silver, and rubber. No more ulcerated teeth sacrificed; they can be filled and cured.

105 Fourth Avenue, Pittsburgh, *November* 29, 1878.

Dr. Richmond:

Dear Sir—It is with pleasure that I write you in regard to the gold crown you mounted on the right superior first bicuspid for Mrs. F. It has proved a success beyond a doubt, and heartily recommend you and your artificial-crown process to the dental profession.

J. R. FINNEY.

68 N. Charles St., Baltimore, Md., *January* 8, 1879.

Dr. Richmond:

Thoroughly understanding your method of gold crowns, I think that it merits all that you claim for it, and that it is a "new departure" which we all should know.

Very respectfully,

M. B. WILKERSON, D. D. S., M. D.

Baltimore, *January* 9, 1879.

Having witnessed in our college, "The Balto. Dental," two clinics given by Dr. Richmond, demonstrating his new method of mounting artificial crowns, I cheerfully recommend it to the "dental profession" as being highly valuable in many cases.

JAS. H. HARRIS.

106 N. 11th Street, Philadelphia, *February* 6, 1879.

Dr. A. S. Richmond:

My Dear Sir—It affords me much pleasure to add my testimony to the beauty and apparent efficiency of your method of adapting gold crowns and porcelain-faced caps to the crownless roots of teeth.

I desire also to express to you my admiration of the simplicity and ingenuity of the various steps of your process, and of the manipulative dexterity with which you demonstrated your method of operating in the mouth of one of my patients.

With kind wishes, I am very truly yours,

J. FOSTER FLAGG.

110 ROCHESTER, 3*d* *March*, 1879.

I have this day witnessed the pivoting of an incisor and building the crown of a bicuspid by Dr. Richmond, of San Francisco, and it seems to me to be as near perfection as it can be brought, and to supply a want long felt in dentistry, and cannot fail to commend itself to all who witness it.

FRANK FRENCH, M. D. S.

Dr. F. Hamilton:

MY DEAR DR.—I beg to introduce to your favorable notice the bearer of this note, Dr. C. M. Richmond. The Doctor has the merit of having added to the dental art a valuable improvement. Any favor shown him in regard to that or other kindred matters, etc., will be thankfully received by him and much appreciated — obedient servant and friend,

A. LEFLER.

A. A. Abbott. C. H. Bunker.

A. A. Abbott & Co., wholesale farm machinery. Manufacturers of sleighs and runner attachments.

COR. BEACH AND SEBOR STS., CHICAGO, *April* 16, 1879.

Mr. C. F. Gray:

DEAR SIR—At the request of Mr. Howard I do not hesitate to say that the tooth I had set by Dr. Richmond gives good satisfaction. I had a front tooth on a pivot for several years, which finally got very troublesome, getting loose very often. I then had it put on a plate, which proved very dirty and irritating to the gum. Now, for the first time in thirteen years, my mouth feels natural, and I would not part with it for anything.

The pain is no more than the filling of a large cavity, and I consider Dr. Richmond the finest mechanical workman I ever saw.

Yours respectfully, A. A. ABBOTT.

Dr. Richmond put in a tooth for me that I would not take money for, and I consider his method of work perfect.

C. H. BUNKER.

111 TOLEDO, O., *May* 6, 1879.

Dr. A. S. Richmond:

DEAR SIR—I am much pleased with your manner of mounting crowns, and, if done according to your instructions, will be perfect in all its parts and durable a lifetime.

Thanking you for your thorough instructions,

I remain, yours truly, H. M. EDSON.

TOLEDO, OHIO, *May* 7, 1879.

Dr. Richmond:

After carefully watching your manipulation in the production of your gold crowns for bicuspids and molars, and porcelain facings for the six anterior teeth, I am convinced that your method and its results cannot be improved upon in rendering useful a class of teeth which have in the past been considered useless and not capable of being saved by any of the old methods.

Yours, J. M. PORTER.

I was instructed in January last by Dr. A. S. Richmond in his mode of applying gold and porcelain-faced crowns to roots of natural teeth, and I have on several occasions since made practical tests of them, and am happy to say that in each case they have given perfect satisfaction both to patients and myself.

E. D. SCHEBLE, D. D. S.

Toledo, Ohio, May 7, 1879.

TOLEDO, *May* 7, 1879.

Dr. Richmond:

DEAR SIR—Allow me to give my feeble endorsement to your beautiful method of mounting artificial crowns, from work seen done last fall and since then. It is all that any one could possibly ask for, and can cheerfully recommend it to the profession.

Yours truly, R. L. EVANS.

112 A. A. Abbott & Co., wholesale farm machinery, cor. Beach and Sebor streets.

CHICAGO, *May* 21, 1879.

A. S. Richmond, Esq.:

DEAR SIR—I take pleasure in saying that the "crown" you put on for me gives perfect satisfaction in every respect. I have had a pivot and a plate tooth, both of which were very unpleasant and annoying, but this has never troubled me a particle. It seems in every way the same as the original tooth, and is perfectly cleanly.

I think you are a public benefactor.

Yours truly, A. A. ABBOTT.

KEOKUK, IOWA, *June* 9, 1879.

Dr. A. S. Richmond:

MY DEAR SIR—Having witnessed your method of setting artificial crowns on roots of teeth, I can freely say that I know of no method superior to it. And as to the process, it is so highly mechanical and thorough that it must be more permanent than ordinary methods, both in the strength of the union and in the protection it affords to the exposed end of the root. The work pleases me much.

Yours most truly, L. C. INGERSOLL.

TORONTO, 12*th July*, 1879.

J. B. Sabine, Esq., London:

DEAR SIR—The bearer, Dr. Richmond, of San Francisco, is the inventor of a new system of attaching crowns to the roots of teeth in the mouth. He has just completed demonstrating his method to Messrs. Hipkins, Thorner, Trotter, and myself. We are all of opinion that the method is very valuable, and an immense advance on anything hitherto practised in this country. He placed a crown on a bicuspid root for me, and, although only coupled one hour, is perfectly comfortable, and gives every indication of permanence and of being equally useful for mastication as the original tooth.

If you can arrange for a clinic for Dr. Richmond I am sure you will be delighted, and be more than repaid for your expenditure of time and money.

Kindly permit Dr. R. to show this note to your London dentists if he desires to do so.

Yours very truly, J. B. WILLMOTT.

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113 BRANTFORD ST., *August* 1, 1879.

J. B. Sabine, Esq.:

DEAR SIR—The bearer, Dr. Richmond, of San Francisco, has just finished demonstrating to McMichael and myself his new process of attaching new crowns to old roots. I take great pleasure in introducing him, and also in recommending the operation as superior to anything I have heretofore seen.

If you can possibly arrange for a case you will be very much pleased with the process. The Doctor put a crown on a bicuspid root for myself, which I cannot say too much for, and if you can have a clinic it will more than repay you.

Yours very truly, G. S. CLESER.

Dr. Sabine:

I have great pleasure in endorsing everything said in above letter. Dr. Richmond's process is a grand thing for the dental profession.

G. H. McMICHAEL.

Office of D. C. Hawxhurst, M. D.—Attention to the eye and ear.

BATTLE CREEK, MICH., *September* 8, 1879.

B. Bannister:

DEAR DOCTOR—I write you this note to introduce to you Dr. A. S. Richmond, of San Francisco, the celebrated Richmond-Crown man. I have taken instructions of him in his method of mounting gold crowns, and have had three mounted by him in my own mouth. There is no question about it, Dr. Richmond has made the greatest advance in operative dentistry that has yet been witnessed since Arthur gave us cohesive foil and made it possible to restore crowns in gold. That was a great discovery, but Dr. Richmond's, to use the words of Atkinson, is simply "magnif.," for it secures a tooth for all time; there can be no more decay.

I am, very sincerely yours, D. C. HAWXHURST.

J. G. Ambler, M. D., dentist, 25 West Twenty-third St., New York.

OCTOBER 13, 1879.

Dr. Witherbee:

DEAR SIR—This will introduce to you my friend Dr. C. M. Richmond, who is a specialist, which specialty he will explain. And I can fully endorse what his own mouth exemplifies, having some of his handy work in my mouth which is as near perfection as anything artificial can be.

Truly yours, etc., J. G. AMBLER.

114 Chas. F. Grey, pres't. Byron L. Smith, cash'r.
J. V. Taylor, vice-pres't. T. L. Forrest, ass't cash'r.

The Hide and Leather Bank of Chicago.

CHICAGO, *October* 23, 1879.

To whom it may concern:

Mr. A. S. Richmond has inserted a crown on the root of one of my teeth in place of a pivot tooth.

The operation has been a complete success, and given entire satisfaction, even beyond my anticipations.

CHAS. F. GREY.

MADISON, N. J., *February* 3, 1880.

Dr. Louis Livingston Seaman, respected kinsman, resident surgeon Ward's Island, New York city:

I take extreme pleasure in introducing to your favorable acquaintance and notice (by this) C. M. Richmond, surgeon dentist, of No. 34 West Thirtieth street, New York city, who has a patent of his own invention, which is a very ingenious and valuable one.

He operated on me and restored a number of teeth, making them nearly as good as natural ones, and gave me exceeding satisfaction.

Very truly, your cousin, F. A. SEAMAN.

NEW YORK, TUESDAY, *June* 9, 1885.

Present: S. J. Gordon, Esq., on behalf of defendants, and George T. Curtis, Jr., Esq., on behalf of complainant.

Adjourned until 1.30 o'clock p. m., Wednesday, June 10, 1885.

115 MONDAY, *June* 22, 1885—11 o'clock a. m.

Present: S. J. Gordon, Esq., on behalf of defendant, and E. N. Dickerson, Jr., Esq., on behalf of complainant.

Cross-examination of ALVAN S. RICHMOND by E. N. DICKERSON, Jr., Esq.:

Counsel for complainant, being of the opinion that the direct examination of this witness was plainly incompetent, proceeds to cross-examine him *de bene esse* only, the said cross-examination to stand or fall by the direct.

16 X Q. I understand that you saw yourself the operation which you have called the "Saffold operation," and which was taken off in Dr. Sheffield's office. Is that the fact?

A. Yes, sir.

17 X Q. And that operation, in your opinion, was a true representation of the operations which were being done by yourself and your brother before your brother's going with Dr. Sheffield? Is that the fact?

A. Yes, sir.

18 X Q. You had neither of you done them any other way than that, so far as you know, had you?

A. Practically the same.

Complainant's counsel offers in evidence a letter and envelope, and marks them "Exhibit Richmond Letter and Envelope."

19 X Q. Is that letter and envelope in your handwriting?

A. Yes, sir.

20 X Q. Have you ever been called upon to construe letters patent previous to the present examination?

A. No, sir.

ALVAN S. RICHMOND.

Subscribed and sworn to before me this 22d day of June, 1885.

[L. S.] JOHN W. RIPLEY,
Notary Public, New York Co.

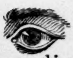
Adjourned until Wednesday, June 24, 1885, at 10 o'clock a. m.

116 "COMPLAINANT'S EXHIBIT RICHMOND LETTER AND ENVELOPE."

J. W. R.,
Sp. Exr.
June 22, '85.

[Letter.]

LANGHAM HOTEL,
PORTLAND PLACE, LONDON, W.
Jan'y 16th, 1885.

You will find out I am a *devil*  more, a *deamon*. (I will live to see you disgraced) and 2 of your clientell doing service for their wrong doings. Don't mistake my words or meaning. I am,

ALVAN S. RICHMOND.

[Envelope.]

E. N. Dickerson, Jr.,
34th St. Near Park Ave.,
New York City,
N. Y.
U. S. A.

Post mark
London, W.
5
Ja 17
85
[Stamp]

New York, Wednesday, *June* 10—1.30 o'clock p. m.

Present: S. J. Gordon, Esq., on behalf of defendants, and George T. Curtis, Jr., Esq., on behalf of complainant.

Aaron L. Northrop, being duly sworn as a witness, deposes and says as follows:

1 Q. What is your name, age, residence, and profession?

A. Aaron L. Northrop; fifty-one years of age; residence, New York city, and a dentist by profession.

2 Q. Please look at the copy of letters patent now shown you, No. 277,941, for an artificial denture, dated May 22, 1883, and say whether you are familiar with and understand the same.

117 A. I am acquainted with it and understand it.

3 Q. Please state when and where you first knew of the practical exercise of the alleged invention called "an artificial denture" therein described, and by whom. State all the circumstances.

Objected to as immaterial and incompetent, the assignor of a patent being estopped to deny its validity, and, further, on the ground that the defendants herein are estopped by reason of the licenses taken by them.

A. In the fall and winter of 1878 I saw it practically in my own office. The operation was performed by Dr. Cassius M. Richmond.

4 Q. In about how many instances did you know of his performing such operations in your office during the time named?

Same objection.

A. In the course of the twelve months from the time he came, in the fall of 1878, I should say he performed it twenty-five times.

5 Q. Please look at the copy of the letters patent No. 277,943, dated May 22, 1883, and state whether you are familiar with and understand the same.

A. I am.

6 Q. State to what extent, if any, the processes claimed in that patent, No. 277,943, were made use of in the operations performed by Dr. C. M. Richmond in your office during the twelve months succeeding the fall of 1878.

Same objection and as immaterial.

A. Not to exceed three.

7 Q. How long have you been familiar with the processes described in letters patent No. 277,943 in your practice of the profession of dentistry?

Same objection.

A. The last twenty years, and I am quite positive ever since I have been in the practice of dentistry.

A. L. NORTHROP.

The right of cross-examination reserved.

118 WEDNESDAY, *June* 24—10 o'clock a. m.

Present: Counsel as before.

Cross-examination of Dr. A. L. NORTHROP by E. N. DICKERSON, Jr., Esq.:

Counsel for complainant, being of the opinion that the direct examination of this witness was plainly incompetent, proceeds to cross-examine him *de bene esse* only, the said cross-examination to stand or fall with the direct.

8 X Q. Were the operations referred to in your direct examination as performed by Dr. Richmond at your office the same operation as is exhibited in "Exhibit Imlay Operation," now before you?

A. The operation performed in my office was essentially the same as this; some cases, one case in particular, the pin that was used was a square pin, some cases it was a screw soldered in, and other cases simply a wire, that was bent a little irregular, soldered in to retain it; otherwise, so far as I can see, the operation is the same.

A. L. NORTHROP.

Subscribed and sworn to before me this 24th day of June, 1885.

JOHN W. RIPLEY,
Notary Public, New York Co.

FRIDAY, *July* 10, 1885.

JOHN K. IMLAY, a witness called and duly sworn, deposes and says as follows:

1 Q. What is your name, age, and residence?

A. John K. Imlay; age, thirty-nine years; residence, New York city.

119 2 Q. Please look at the exhibit now shown you, which the examiner will please mark "Exhibit Imlay," and state what it is, if you recognize it. Tell all about it.

Objected to as immaterial and incompetent, and, further, the assignor of a patent being estopped to deny its validity, and, further, on the ground that the defendants herein are estopped by reason of the licenses taken by them.

A. It is a tooth that was placed in my mouth about November, 1878, by Dr. C. M. Richmond, and which I wore there until about May, 1884, when I broke it out.

3 Q. Any other similar teeth placed in your mouth by Dr. Richmond at the same time; if so, how many?

Same objection.

A. There were two more at the same time.

4 Q. Please state whether or not said teeth any time prior to May, 1881, and, if so, how many times and where said teeth were exhibited to Dr. Lucius T. Sheffield, and who was present, and for what purpose were they shown.

Same objection.

A. I remember that some time, I think it was in the fall of 1880, Dr. C. M. Richmond introduced me to Dr. Sheffield and showed him the teeth in my mouth. This was at the Sturtevant House. At the same time the Doctor informed me he was about forming a copartnership with Dr. Sheffield. I remember another occasion. I went with the Doctor to a house in Thirty-second street—I don't remember the number—where Dr. C. M. Richmond's office was. My teeth were there again shown to Dr. Sheffield, who was there.

J. K. IMLAY.

The right of cross-examination waived.

Subscribed and sworn to before me this 10th day of June, 1885.

[L. S.] JOHN W. RIPLEY,
Notary Public, New York Co.

Adjourned until Wednesday, June 17, 1885, at eleven o'clock a. m.

120 New York, Tuesday, *July* 14, 1885—11 o'clock a. m.

Present: S. J. Gordon, Esq., on behalf of defendants, W. A. Pollock, Esq., representing Dicherson & Dickerson, on behalf of complainant.

John B. Rich, a witness produced on the part of the defendants, being duly sworn, deposes and says as follows:

1 Q. What is your name, age, residence, and profession?

A. John B. Rich; rising seventy years of age; residence, New York city; and a dentist by profession.

2 Q. How long and where have you practised dentistry and what experience have you had in practical and theoretical mechanics and as an expert in controversies under letters patent?

A. I have practised dentistry in the city of New York since 1837. I have had some experience and acquired considerable knowledge in the science of mechanics to qualify myself as an expert, and I have acted as an expert in controversies in regard to patents, especially as to sewing-machines.

121 Defendants' counsel offers the model shown in evidence and requests it to be marked "Defendants' Exhibit Smith."

3 Q. Have you read and do you understand the Cassius M. Richmond letters patent No. 277,938 and No. 277,941?

A. I have read them and understand them.

4 Q. When, if ever, did you make the acquaintance of Cassius M. Richmond? State the circumstances, and what information did you then obtain about the inventions described in letters patent No. 277,938 and 277,941.

A. About six years ago Cassius M. Richmond called at my office in New York city to explain to me a method that he practiced for setting artificial crowns on the fangs of the natural teeth. He thoroughly explained this method to me by descriptions and working model of the natural size, and requested me to allow him to perform such work for me in the mouths of my patients; that method that he exhibited to me then is the identical method described in the letters patent inquired about and stated in the question, and which he did not at that time claim to be original with him. I made an appointment with him to set a crown for one of my patients, according to his method, which he postponed several times. As I could not wait for him, the crown was set by another method in that case.

5 Q. Have you read and do you understand the Cassius M. Richmond letters patent No. 277,943?

A. Yes; I have read it and do understand it.

6 Q. As a dentist, please give us your knowledge and experience as to the processes of crown excision and pulp extirpation described therein.

Same objection as to question 5.

A. In regard to crown excision, the method of grooving them on two sides with a file previous to excising it with the excising forceps has been known and practiced by me since I was a student in dentistry. The incision or groove made by means of a circular file, saw, or corundum, or emery wheel has been known to me since the introduction into dental practice of the "burring engine," some ten or fifteen years since.

The crown was then excised by placing the edge of the blades of
the excising forceps in the grooves made by the file or wheel
122 and bringing the blades together by the lever handle of the
said forceps with sufficient force to snap off the part of the
tooth intended to be excised.

The excising forceps spoken of and in use by me forty odd years ago is identical with the instrument figured and attached to the letters patent about which this question is asked.

The method of extirpating the pulp by means of pieces of wood being plunged into the pulp cavity and channels has been known to me since 1842. Between 1842 and 1845 I attempted to extirpate a number of live pulps by plunging splinters of wood into the nerve channels for the purpose of cutting off the pulp from the organs that supplied it with vitality, passing through the foramen in the apex of the fang. This method of destroying the vitality of the pulp proved a failure and was abandoned for that reason.

About the same time I made many experiments to endeavor to fill the pulp channels, after the pulp had been removed, with wood instead of gold, which I had previously used; but, after preparing the wood used by saturating it with various substances for the purpose of rendering it indestructible, that method was also abandoned as being impracticable. It is impracticable in many ways.

7 Q. What differences were there between the processes adopted by you and those described in the third and fourth claims of letters patent No. 277,943?

Same objection as to question 5.

A. There was no material difference as far as I can judge, as in the patent there is no mention made of how the wood is to be prepared for use in the process described.

I regard the method stated in said letters patent, of only filling the upper part of the nerve cavity, as a very dangerous and imperfect method.

JOHN B. RICH.

Rights of objection and cross-examination reserved.

Adjourned until Thursday, July 23, 1885, at 11 o'clock a. m., for direct examination of witnesses.

123 Wednesday, *June* 24, 1885—4 o'clock p. m.

Present: S. J. Gordon, Esq., on behalf of defendants, and George T. Curtis, Jr., Esq., on behalf of complainant.

Norman W. Kingsley, a witness produced on the part of defendants, being duly sworn, deposes and says as follows:

1 Q. What is your name, age, residence, and profession?

A. Norman W. Kingsley; over fifty years of age; residence, New York city, and a dentist by profession.

2 Q. How long and where have you practiced dentistry, and what occasion have you had to examine and become familiar with letters patent?

124 A. I have practised dentistry in New York city thirty-three years and was in practice before that time.

I think I have read most of the patents that have been granted for dental inventions; have had examinations made in view of having patents obtained for myself, and have also had one patent granted to me.

3 Q. Have you read and do you understand the letters patent to C. M. Richmond, No. 277,943, a copy of which is now shown you?

A. Yes; I am familiar with that patent and understand the operations therein described.

4 Q. What do you find described and claimed therein as the alleged invention of C. M. Richmond?

A. Seems to be summed up in paragraphs 1, 2, 3, and 4, at the end of the specification.

This, as I find it, is the excising the crown of a tooth or whatever remains of it; the removal of any pulp, if there be any there; the treatment of the root, if treatment is needed—but it is not always needed—and the preparation of the root for the reception of the artificial denture in the manner described.

5 Q. How long, as a practising dentist, have you known of the public use and employment by dentists of the process described in patent No. 277,943, of excising a tooth and expelling a nerve and plugging the nerve cavity? State the circumstances.

Objected to as immaterial and incompetent, the defendants herein being estopped from contesting the validity of the said letters patent.

A. I think it was one of the earliest things I knew in dentistry—as early as 1850. I cannot recall any time after the beginning of my studies in dentistry that I was not familiar with that process. I certainly did it thirty-five years ago.

6 Q. Have you read and do you understand letters patent No. 277,941, to C. M. Richmond?

A. Yes; I am familiar with that patent and understand the operations therein described.

7 Q. When did C. M. Richmond, to your knowledge, first make and apply the artificial denture therein described and claimed—under what circumstances and to what extent?

Same objection as to question 5.

125 I do not remember the months, the year, nor the day of the month, but I do remember that Dr. C. M. Richmond stated to me that he had been in New York only a day or two since he arrived from Chicago, and that I was the first dentist that he had called upon or exhibited his methods to.

Within a few days subsequent to the above interview he made some artificial crowns, such as are described in this patent, in my laboratory, and told me they were for some patients of his who were stopping at the hotel. A few weeks subsequent to that time he made and applied the same inventions to a patient of my own in my office, and still later others that I don't now recall—possibly in four or five instances. I was doing it at the same time myself for my own patients. His services rendered to me were only given when I was so crowded with work that I could not do it myself.

NORMAN W. KINGSLEY.

Objections and cross-examination reserved.

Adjourned until Monday, June 29, 1885, at 11 o'clock a. m.

MONDAY, *June* 29, 1885—11 o'clock a. m.

Present: S. J. Gordon, Esq., on behalf of defendants, and Walter D. Edmonds, Esq., on behalf of complainant.

Adjourned until Tuesday, July 14, 1885, at 11 o'clock a. m.

126 Circuit Court of the United States, Southern District of New York.

THE INTERNATIONAL TOOTH CROWN CO.
vs. } In Equity.
EDWARD S. GAYLORD *et al.*

Evidence for Defendants.

Testimony taken under and pursuant to the 67th rule of the Supreme Court of the United States, in equity, as amended, before Francis G. Beach, notary public, pursuant to notice and by consent of parties.

Present: E. N. Dickerson, Jr., Esq., counsel for complainant, and John K. Beach, Esq., counsel for defendants.

NEW HAVEN, CONN., *Feb.* 9, 1886—11 o'clock a. m.

JOHN E. EARLE, a witness produced by and on behalf of the defendants, being duly sworn, testified as follows:

1 Q. What is your name, age, residence, and occupation?

A. John E. Earle; my age is fifty-five years; I reside in New Haven, Conn., and am solicitor of patents.

2 Q. Have you recently had committed to your care a tooth crown with root attached? And, if so, say from whom you received the same, and please produce it, to be marked as an exhibit in this cause.

127 A. I have. I received the tooth from Mrs. John E. Searles, Jr., residing, I believe, in Brooklyn, N. Y. I received it in the office of Dr. E. S. Gaylord, dentist, New Haven, Conn., and at the time of receiving it the portion of the back or inner side was ground off under my directions to expose the interior of the tooth and show the connection between the crown and root. The tooth has been in my possession up to this time. I received the tooth on the 29th of January, 1886. I produce the tooth and give it to the examiner.

Defendants' counsel offers the tooth in evidence, and the same is marked "Defendants' Exhibit Searles No. 1," Francis G. Beach, notary public.

Cross-examination waived.

JOHN E. EARLE.

Subscribed and sworn to this 9th day of February, 1886, before me—

FRANCIS G. BEACH,
Notary Public, Acting by Consent as Special Examiner.

EDWARD S. GAYLORD, a witness produced by and on behalf of the defendants, having been duly sworn, testified as follows:

1 Q. What is your name, age, residence, and occupation?

A. Name is Edward S. Gaylord; forty-four years old; I reside in New Haven, Conn., and am a dentist.

2 Q. How long have you been in active practice as a dentist?

A. I have been in practice for myself for twenty-four years.

3 Q. Whether or not in the course of your practice you have known and used an enclosing cap attached to and surrounding a prepared root, having its natural terminal contour near the margin of the gum for supporting an artificial denture?

Objected to as leading and as immaterial.

A. I have; yes.

128 4 Q. State when and under what circumstances you first began the use of that combination.

A. In April, 1879, I first began the use of that combination. On hearing of the introduction of the process by Mr. Richmond in New York, I went there and had an interview with him, arranged for him to come here and give me instructions, which he did in March, 1879, performing two operations in my own mouth and one in a patient—a dentist in the city.

Same objection to question 4.

5 Q. Whether or not you paid Dr. Richmond for these operations and instructions?

A. I did.

6 Q. Have you any evidence of that payment? And, if so, please produce it.

A. I have now the check and I produce it.

Defendants' counsel offers check in evidence, and the same is marked "Exhibit Richmond Check," Francis G. Beach, notary public, special examiner.

7 Q. Have you caused to be prepared any models of the operations in which Dr. Richmond instructed you in March, 1879? And, if so, please produce them.

A. I have, and produce them.

Defendants' counsel offers model in evidence, and same is marked "Defendants' Exhibit Gaylord Model," Francis G. Beach, notary public, special examiner.

8 Q. You say that you first began the practice of such operations as those shown in "Defendants' Exhibit Gaylord Model" in April, 1879. Can you give the names of any patients upon whom you performed these operations in April, 1879?

A. I can.

9 Q. Please do so.

A. Mr. and Mrs. John E. Searles; that is all in April, 1879.

10 Q. Do you know anything of the subsequent history of the operations which you put into the mouth of Mrs. John E. Searles in April, 1879?

129 A. I do.

11 Q. State first upon what teeth those operations were

performed, and then state what you know of their subsequent history.

A. The first operation was performed upon the left superior first bicuspid of Mrs. Searles. The second was on the superior left lateral. Seeing her occasionally, I knew that they were in place and doing well. Some two years, I think, after the setting of the lateral she brought me the tooth broken from the root.

12 Q. Have you that tooth now in your possession? And, if so please produce it.

A. I have, and I produce it.

Defendants' counsel offers the tooth in evidence, and the same is marked "Defendants' Exhibit Searles No. 2," Francis G. Beach, notary public, special examiner.

13 Q. Now go on with the subsequent history of the other operation as far as you know.

A. The first operation I saw from time to time, as the second. It was satisfactory until within this last month, when I learned of its failure. By my request she brought it to me. On her bringing it to me I made a section of the tooth by grinding away a portion of it. The tooth failed from the deposit of tartar upon the root.

14 Q. What became of that tooth after you had ground away part of it, if you know?

A. I placed it in the hands of Mr. John E. Earle.

15 Q. Please look at "Exhibit Searles No. 2," which is now shown you, and say whether or not it is the tooth which you ground away and gave to Mr. Earle.

A. This is the tooth.

16 Q. Have you any means of fixing the dates at which you performed the operations "Defendants' Exhibit Searles No. 1" and "Defendants' Exhibit Searles No. 2"?

A. I have, by my books.

17 Q. On what dates were these operations performed?

A. "Exhibit Searles No. 1" was performed April 19, 1879; No. 2 was performed May 20, 1879.

18 —. Have you any objection to putting that book in evidence?

A. I have objections.

130 Defendants' counsel requests the examiner to mark the book, for identification, "Exhibit Gaylord Dental Register," and take a copy of the record referred to by the witness, said copy to be put in evidence as an exhibit, which is accordingly done, and the same is marked "Defendants' Exhibit Searles No. 3," copy, Francis G. Beach, notary public, special examiner.

19 Q. Does the book "Exhibit Gaylord Dental Register" show any other action of operations similar to those shown by "Defendants' Exhibit Gaylord Model" subsequent to April, 1879?

A. It does.

20 Q. Whether or not you continued the practice of setting tooth crowns having an enclosing cap surrounding the prepared root and

supporting an artificial crown between April, 1879, and December, 1880?

A. I have.

21 Q. And were or were not such enclosing caps always attached to the prepared root by the means of attachment shown in "Defendants' Exhibit Searles No. 1" and "Defendants' Exhibit Searles No. 2"?

A. They were not always attached as shown in "Defendants' Exhibit Searles No. 1 and No. 2." Other means of attachment was by a screw.

22 Q. By such a screw as is shown in "Defendants' Exhibit Gaylord model"?

A. Yes.

23 Q. Do I understand you to say that you used both screws and posts for attaching the enclosing cap and crown to the prepared root between April, 1879, and December, 1880?

A. I have.

24 Q. Whether or not these two methods of attachment were used indifferently in your practice?

Counsel for complainant states that the screw operation not being in controversy here, but being the subject of a separate patent, this testimony does not seem to be very material.

Counsel for defendants begs leave to differ as to the subject of the present controversy.

A. They were.

131 25 Q. Have you any other means of fixing the dates of the operations "Exhibits Searles No. 1 and Searles No. 2" than the record already referred to?

A. I have, by a receipted bill, which I here produce.

Defendants' counsel offers the receipted bill in evidence, and the same is marked "Defendants' Exhibit Searles No. 4," Francis G. Beach, notary public, special examiner.

26 Q. State in a general way to what extent you used in your practice the operation of setting tooth crowns having an enclosing cap surrounding the prepared root, having its natural terminal contour near the margin of the gum and supporting an artificial crown, between April, 1879, and December, 1880.

A. I set quite a number of them.

27 Q. Look at "Defendants' Exhibit Searles No. 1" and say in what manner the metallic backing of that crown, the ferrule, and the pin which passes through the ferrule into the root were united to form the complete crown.

A. I cemented it to the root.

28 Q. Please say in what manner the pin is attached to the gold backing in that crown.

A. By gold solder.

29 Q. And in what manner the ferrule is attached to the backing.

A. By gold solder.

30 Q. Now, please hear question 27 read and your answer thereto and say whether or not you desire to change your answer.

A. I inferred by your question that you wished me to state as to whether that was a finished operation before attaching it to the root. If that is correct, I do not wish to change the answer.

Cross-examinaton:

31 Q. Does "Defendants' Exhibit Searles No 1" represent identically, except in size, all the operations done by you in which crowns and caps were united to roots without a screw prior to 1882?

A. It does, except in material. I sometimes used platinum and iridium wire as a post or pin instead of a gold post or pin.

32 X Q. And in regard to the screw operations, the structure and method of connection of the backing and crown was the same 132 as that in Defendants' Exhibit Searles No. 1," in all cases, was it not?

A. The same.

33 X Q. The operations which you so practised prior to 1882 were identically the operations taught you by C. M. Richmond prior to March 24, 1879, and which he demonstrated to you, were they not?

A. I should hardly say they were identically.

34 X Q. State all the respects in which they differed.

A. In respect to material of the posts or pins and the screws and nuts, but not otherwise. The principle is the same.

35 X Q. Will you be good enough to cut the metal in "Defendants' Exhibit Searles No. 1" at the point indicated by me to you?

A. I have cut it.

36 X Q. Is there not a cement between the band and the upper end of the porcelain crown in "Defendants' Exhibit Searles No. 1"?

A. There is, separated from the porcelain crown by a thin gold plate.

37 X Q. I mean is there not a cement visible on inspection between the gold and the upper part of the porcelain.

A. I should say there was not.

38 X Q. Can you, without destroying it, separate the root from the artificial denture in "Defendants' Exhibit Searles No. 1"?

A. I should say you cannot without seriously marring it.

39 X Q. Has "Defendants' Exhibit Searles No. 1" been in your continuous possession until delivered to Mr. Earle, from the time it was given you by Mrs. Searles, and is it now in identically that condition except for the grinding?

A. It was never in my possession except for a sufficient length of time for me to grind as you see it. It is now in the same condition as when given me.

40 X Q. And you identify this as the original operation made by you for Mrs. Searles, as you have testified, do you?

A. So far as possible.

41 X Q. Do you or do you not positively swear that this is the identical operation a record of which is contained in your register at page 24?

A. I believe it to be the identical operation.

42 X Q. But you will not swear to it positively?

133 A. I will, believing that she has never had any but this one crown set upon that root.

43 X Q. Will you swear either to this operation or "Exhibit Searles No. 2," of your own knowledge, as being the identical operation a record of which is contained on page 24 of your register?

A. I will.

44 X Q. Please give me the names and addresses from your register of any other patients for whom you made tooth crowns like "Exhibit Searles No. 1" prior to 1883.

A. I will produce the patients having these operations, but giving names and addresses indefinitely I should object to. I will give a limited number: Mrs. S. S. Thompson, New Haven, May 17, 1879; Mrs. Prof. W. P. Trowbridge, New Haven, May 21 and May 24, 1879, two operations; Henry L. Cannon, New Haven, May 31, 1879; Prof. Franklin Carter, Williamstown, Mass., June 2, 1879; Mrs. Wm. Gale, New Haven, July 12, 1879; Prof. W. K. Townsend, New Haven, July 24, 1880; George L. Cook, New Haven, Nov. 12, 1880; Mrs. Chas. Kimberly, New Haven, April 8, 1880; Mrs. Henry Parmelee, New Haven, June 15, 1881; Miss Nellie Oakford, New Haven, Jan. 9, 1882; Miss Annie Hadley, New Haven, March 30, 1882; Miss S. Sargent, New Haven, April 7, 1882. There seem to have been no Richmond crowns set after April 7, 1882, until January, 1883. Quite a number of Bonwill crowns appear, however.

45 X Q. Will you please cut with your corundum wheel through the porcelain and gold band of "Defendants' Exhibit Searles No. 1"?

A. I will.

Witness grinds off portion of the front of the porcelain crown adjacent to the surrounding ring.

Adjourned to New York.

EDWARD S. GAYLORD.

Subscribed and sworn to this 9th day of February, 1886, before me—

FRANCIS G. BEACH,
Notary Public, Special Examiner.

134 Circuit Court of the United States, Southern District of New York.

THE INTERNATIONAL TOOTH CROWN CO.
vs. } In Equity.
EDWARD S. GAYLORD *et al.*

NEW YORK, *February* 11, 1886.

Testimony Taken on Behalf of the Defendants.

Present: S. J. Gordon, Esq., and John K. Beach, Esq., on the part of defendants, and E. N. Dickerson, Jr., Esq., and Walter D. Edmonds, Esq., counsel for complainant.

WILLIAM HENRY ATKINSON, being called and duly affirmed as a witness, deposes and says as follows to interrogatories propounded by J. K. BEACH, Esq.:

1 Q. What is your name, age, residence, and profession?

A. William Henry Atkinson; aged, seventy-one; reside in New York city, 41 East Ninth street.

2 Q. How long have you been in active practice as a dentist?

A. Since 1835.

3 Q. Are you connected with any college of dentistry; and, if so, in what capacity?

A. I am connected with the Boston Dental College as
135 chairman of the board of examiners, and the Baltimore College of Dental Surgery, on the board of visitors and clinical instructor.

4 Q. Please look at letters patent No. 277,943 and say whether you have read the same and if you understand it.

A. I have read the claims as set forth in the four paragraphs descriptive of the claims of knocking out the nerve, as it is called.

Counsel for complainant objects to the examination of this witness as an expert on the patent question unless he be duly qualified as such; and, secondly, if he qualified as a patent expert he objects to his examination in any way in connection with these patents, unless it be shown that he has made a careful study of said patent and fully understands it; and he further calls the attention of the counsel for defendants that he will be bound by the answers of this witness, whether he be properly qualified or not.

5 Q. Without referring to the precise language of the patent, please say whether or not you have known of that process of extirpating the nerve and filling a tooth, which consists in grooving the tooth at its proper points, in cutting off the parts with a pair of excising forceps—the part below the groove—and removing the nerve by plunging a piece of wood up into the nerve canal.

Question is withdrawn on proposed objection.

6 Q. State what methods of nerve extirpation you have known and used in your practice as a dentist prior to 1880.

A. The first method I ever knew was the use of hickory or heart of oak, shaped to correspond to the size of the nerve canal or pulp chamber at or near the middle of the root of the tooth, into which the timber was thrust as far as it would go, suddenly twisting it around and withdrawing it, to which the pulp usually was attached.

7 Q. If you used any means for exposing the nerve canal prior to thrusting the wood into it, state what those means were.

Objected to as leading.

A. A three-cornered file and cutting forceps that came in with the original method of setting pivot teeth on roots with living pulps or in cases where they were dead.

8 Q. Please say how you used the file and forceps.

A. Directly across the tooth, to make a little check on the anterior and posterior faces of the tooth, into which the cutting forceps were inserted, so as to prevent splitting of the root.

136 9 Q. About how long have you known and used the process described in your last three answers?

A. Over forty-five years.

W. H. ATKINSON.

Subscribed and sworn to before me this 11th day of February, 1886.

JOHN W. RIPLEY,
Notary Public, N. Y. Co.

137 FRIDAY, *February* 12, 1886—11 o'clock a. m.

Present: S. J. Gordon, Esq., and John K. Beach, Esq., on behalf of the defendants, and E. N. Dickerson, Jr., Esq., on behalf of the complainant.

Mrs. CAROLINE SEARLES, being called and duly sworn as a witness, deposes and says as follows:

1 Q. What is your name and residence?

A. Caroline Searles, and reside in Brooklyn, N. Y., at No. 810 St. Mark's avenue.

2 Q. Please look at "Defendants' Exhibit- Searles No. 1 and Searles No. 2" and say if you know what they are.

A. They are my teeth.

3 Q. When and by whom were those teeth put into your mouth?

A. In 1879, by Dr. E. S. Gaylord, of New Haven.

4 Q. How do you fix that date?

A. By a relative returning from the West Indies.

5 Q. Have you employed any other dentist than Dr. Gaylord since 1878?

A. Yes, two—Dr. Crandall and Dr. Dickerson, both in Brooklyn.

6 Q. Please state the circumstances and the time when these two teeth came out of your mouth, beginning with Exhibit No. 1.

A. No. 1 came out in the spring of 1885. I forget when No. 2 came out.

7 Q. Is there any way in which you can refresh your memory on that point?

A. Only by the bill.

8 Q. By what bill? What was the bill for?

A. It was for making a plate with one tooth on it to replace the tooth that came out.

9 Q. Have you that bill with you; and, if so, will you produce it?

A. Here it is.

Offered in evidence by defendants and request made that it be marked "Defendants' Exhibit No. 5," and it is so marked.

10 Q. Now, Mrs. Searles, you say you recognize these exhibits as teeth which were put into your mouth by Dr. Gaylord in 1879; can you tell us how you are able to identify them?

138 A. No. 1 by the root and No. 2 by the shape of the porcelain front and the cutting away of the back.

11 Q. Have these teeth, "Exhibits Searles Nos. 1 and 2," been in your possession until you delivered them to Mr. Earle and to Dr. Gaylord respectively?

A. Yes.

12 Q. When did you so deliver them?

A. No. 1, two weeks ago, to Mr. Earle; No. 2, to Dr. Gaylord, immediately after it came out.

13 Q. And are these teeth now in the same condition as when they left your possession?

A. "No. 1" was ground in my presence, and "No. 2," the cement has been picked out.

14 Q. Did Mr. Crandall or Mr. Dickerson or either of them ever do anything to either one of the teeth, "Defendants' Exhibits Searles Nos. 1 and 2?"

A. No.

Cross-examined by Mr. DICKERSON:

15 X Q. With regard to Exhibit No. 2, was the removal of the cement to which you refer done on the front of the tooth?

A. No.

16 X Q. Where was the cement to which you refer removed?

A. From the root.

17 X Q. Did you see Dr. Gaylord make either of these operations?

A. No.

18 X Q. Suppose, after these teeth left your possession, they had been skilfully and exactly copied, so that the external appearance of the copy was just like that of the original, under those circumstances is it not possible that Exhibits Nos. 1 and 2 might be, in fact, the copies and not the originals?

A. If they were exact I don't suppose I could tell the difference.

CAROLINE A. SEARLES.

Subscribed and sworn to before me this 12th day of February, 1886.

JOHN W. RIPLEY,
Notary Public, New York Co.

Adjourned to February 20, at 11 a. m.

139 NEW YORK, SATURDAY, *February* 20, 1886—11 o'clock a. m.

Present: S. J. Gordon, Esq., and John K. Beach, Esq., counsel for defendants; E. N. Dickerson, Jr., Esq., and Walter D. Edmonds, Esq., counsel for complainant.

Dr. WILLIAM N. MORRISON, a witness produced by and on behalf of the defendants, being duly sworn, deposes and says as follows:

1 Q. What is your name, age, residence, and profession?

A. William N. Morrison; forty-three years of age; residence, St. Louis, Mo., and a dentist by profession.

2 Q. Where were you educated in dentistry, and how long have you practised it?

A. I graduated at the Ohio Dental College, in Cincinnati, in 1864. I had for my preceptors previous to that my brother, J. B. Morrison and Dr. C. W. Spalding, in St. Louis. I was in their offices as a student.

3 Q. Please look at the article entitled "A new operation," on page 184 of the Missouri Dental Journal, May number, volume 1, published at St. Louis in 1869, signed "N," and state what, if anything, you know of the authorship thereof.

Objected to as incompetent and improper and as containing assumptions which are not in proof herein.

A. I am the author of that article and performed the operation therein described and signed it with my middle initial letter. At that time I was an associate editor of that journal, and it was our custom to sign our initial to an article furnished by such officers of the Journal.

I am now president of the Journal and Library Association of St. Louis, which continues this Missouri journal under another name—Archives of Dentistry.

Counsel for defendants states the article in question reads as follows:

A new operation.

"Miss W. came to me with a first left lower molar decayed to the extent that the entire lingual and a greater part of the labial surfaces below the gum were removed. The roots were filled
140 properly with gold, and the crown had been filled several times; the last time the crown was built up in good style, but the two walls being of such a shape that the filling could not be made self-retaining, I took a natural tooth, corresponding as nearly as possible in size and shape to its fellow of the opposite side,

and imbedded its roots in plaster to make a model from which to get a metallic die over which to swage a gold cap. I used a thin piece of pure gold plate, cutting it at the corners, giving but a slight lap for soldering after it was perfectly fitted to the die. I then fitted this cap accurately to the remaining portion of the tooth in the patient's mouth, allowing it to extend under the free margin of the gum quite to the alveolus, which was about the thirty-second part of an inch below the margin of decay. After soldering a bar across the cap from the lingual to the labial surfaces it was finished and polished at the lathe. I then prepared the patient's mouth as usual for filling; made a thin paste of oxychloride of zinc, filled the cap, and pressed it to its place. The superfluous cement was crowded out of the cap and removed at the margin of the gum. I had the pleasure of seeing that tooth to-day, nearly four months after the operation, and had the gratification of seeing and hearing it pronounced a perfect success.

N."

The volume referred to is produced and offered in evidence as "Defendants' Exhibit Missouri Dental Journal."

Counsel for complainant objects to the insertion of said article in the record and to the offering and admission in evidence of the volume referred to as immaterial, irrelevant, improper, and incompetent.

WM. N. MORRISON.

Adjourned until Tuesday, February 23, 1886, at 2 o'clock p. m.

141 NEW YORK, TUESDAY, *February* 23, 1886—1 o'clock p. m.

Met pursuant to adjournment.

Present: S. J. Gordon, Esq., and John K. Beach, Esq., for defendants, and Walter D. Edmonds, Esq., on behalf of complainant.

Mr. Edmonds states to the court that Mr. E. N. Dickerson, Jr., Esq., of Dickerson & Dickerson, solicitors for complainant, is unavoidably absent by reason of actual attendance before his honor Judge Wallace, in the argument of another cause, and will not be able to attend before to-morrow for the purpose of concluding his cross-examination of the witness Dr. Morrison.

On consent of defendants' solicitors said cross-examination is adjourned until 12 o'clock m., February 24, 1886.

MONDAY, *March* 8, 1886—11.30 a. m.

Adjourned until Saturday, March 13, 1886, at 12 m.

NEW YORK, *March* 13, 1886.

Met pursuant to notice.

Present: Same parties.

Dr. A. L. NORTHRUP recalled, testified, in answer to questions by Mr. BEACH, as follows:

1 Q. Have you already testified in this case?

142 A. I have.

2 Q. Have you any sample of the operations which you testified that Dr. Richmond performed in your office during the years 1879 and 1880?

Objected to if an attempt is now to be made to impeach this witness by inducing him to swear otherwise than he has heretofore sworn.

A. I have a sample that I suppose to be one of the operations that Dr. Richmond performed in my office in 1879.

3 Q. Please produce it.

Same objection.

A. I do.

Defendants' counsel offers the same in evidence and marks it "Defendants' Exhibit Richmond Screw Operation."

Same objection to offer.

4 Q. When was said operation, "Defendants' Richmond Screw Operation," made, to the best of your knowledge and belief?

Same objection; further, as incompetent and immaterial.

A. In the latter part of September, 1879.

5 Q. And by whom?

A. Dr. C. M. Richmond.

6 Q. And did you see him make it or any part of it?

Same objection; and, furthermore, the attention of the court is called to the endeavor of counsel to force the recollection of this witness.

A. I suppose that I saw him make a portion of it; was not standing by all the time.

7 Q. In whose mouth was it put?

Same objection.

A. Mrs. Paul Fuller.

143 8 Q. Was she a patient of yours?

Same objection.

A. She was at that time.

9 Q. Do you know anything of the subsequent history of that operation? If so, please state it.

Same objection.

A. After the operation was performed, the teeth put in by Dr. Richmond were a continual source of annoyance to the patient—uneasiness—until I finally advised their removal and a plate inserted in the place. I recommended her to Dr. Burt, and requested him when he extracted those teeth to return the teeth to me.

10 Q. Well, did he send you any teeth that he said were the ones?

Same objection.

A. He sent me teeth that he said were the ones that he extracted from Mrs. Fuller's mouth. The exhibit is one of those teeth.

11 Q. When was it that this exhibit was sent to you by Dr. Burt?

Same objection.

A. To the best of my knowledge, it was in July, 1881.

12 Q. State whether or not the exhibit, "Defendants' Exhibit Richmond Screw Operation," has been in your possession since it was sent to you by Dr. Burt.

Same objection.

A. It has been in my instrument case ever since to the present time. I suppose that would be possession, would it not? It has been in my possession ever since.

13 Q. Is it now in the same condition as when it was sent to you by Dr. Burt?

Same objection.

A. No, sir.

14 Q. State all the alterations that have been made in it since that time.

Same objection.

144 A. It was attached to the decayed root by means of cement. I separated the root and the cement from the crown, so that the exhibit is free now from root and cement.

15 Q. I notice that the upper end of the porcelain crown is very much broken away. Do you know anything about that?

Same objection.

A. It was fractured when it came to me, the piece remaining there, but dropped off afterwards.

16 Q. I notice in this "Exhibit Richmond Screw Operation" a thin piece of platinum, which appears to have been interposed between the porcelain crown at its upper portion and the cement. When Dr. Richmond was in your office in 1879 did he or did he not, to your knowledge, make tooth crowns in which a similar metallic sheet was interposed between the upper portion of the porcelain crown and the cement in the finished operation?

Same objection; further objected to, in the first place, as a manifest misstatement of the exhibit now in the hands of the counsel; secondly, as being grossly leading. The attention of the court is again called to the attempt of counsel to force the recollection of the witness.

A. I think he used them both ways.

Answer objected to as immaterial.

17 Q. Please look at the "Exhibit Richmond Screw Operation" and explain, if you can, the broken condition of the platinum sheet to which I have called your attention.

Same objection; further, as a manifest misstatement of the condition of the operation, and, further, as immaterial.

A. I should suppose that it was done when the tooth was fractured.

18 Q. Have you any record of work done by C. M. Richmond for Mrs. Fuller in 1879?

Same objection.

A. Nothing but his bill rendered.

19 Q. Will you produce that?

145 Same objection.

A. I do.

Defendants' counsel offers the bill produced by the witness in evidence, and requests that the same be marked "Defendants' Exhibit Richmond Bill."

Same objection.

Cross-examination *de bene esse:*

20 X Q. Do you intend by anything you have testified to to-day, in the modified way in which you have sworn to it, to contradict what you swore to upon your previous cross-examination in this case?

A. I do not.

21 X Q. What you previously swore to is still, as you believe, true, then, is it not?

A. Yes.

22 X Q. The operation which you have produced seems to be of that class of operations in which a retaining screw-threaded tube is first inserted in the root, and the operation is then attached to that internally screw-threaded tube; is not that the fact?

A. I should think it was.

23 X Q. You find in this operation that the central pin screws up into a tube having an internal screw-thread, do you not?

A. I do.

Signature waived.

It is stipulated by the counsel for the respective parties that subsequent to the examination of the last witness the examiner innocently, with a pair of pliers, compressed the external screw-threaded tube upon the internal screw-threaded metallic pin so as to prevent the revolution of said tube upon the pin, which tube before said alteration screwed freely up and down upon said pin and might be wholly removed therefrom.

SATURDAY, *March* 20, 1886—11 o'clock a. m.

Present: S. J. Gordon, Esq., on behalf of the defendants, and E. N. Dickerson, Jr., Esq., on behalf of the complainant.

Dr. J. B. RICH, being recalled, deposes and says as follows to cross-questions propounded by *by* Mr. GORDON:

146 8 Q. Who was the inventor of the nerve-channel filling?

Same objection.

A. I claim to be the inventor, although that claim may be explained by saying that Dr. Maynard, of Washington city, invented the same process in about the same year—the identical process.

9 Q. How did you get the nerve or pulp out?

Same objection.

A. Well, they had several methods of getting it out. One method was to paralyze it with arsenic and remove it with fine steel barbed instruments. That is one method of removing it; and, as far as the removal is concerned, that and very fine barbed broach and very fine hooks is about the only method of removing it. To extirpate the nerve or destroy its vitality, very fine steel broaches have been used as one means, plunging it into the body of the nerve and down to the apex of the fang, and cutting it off and destroying; another method of destroying its vitality is by the application of arsenious acid. Those are the successful methods.

Same objection.

10 Q. How did you and Dr. Maynard fill the nerve channels after the pulp was removed?

Same objection.

A. Our original idea was to fill it solid from the apex of the fang with very fine strips of gold-foil, inserted with very fine, flexible steel instruments. That is the method that we pursued for many years. I have endeavored to fill the nerve channels after the nerve has been removed by forcing into the nerve channel splinters of wood that had been prepared by soaking in creosote or spirits of turpentine; but now the best method of filling the fangs is by a solution of gutta-percha in chloroform forced up into the fang by pressure. Very thin oxychloride has been used for the same purpose, forming a very perfect adaptation to the base, but the best substance that we know of is solution of gutta-percha and chloroform, and that is the method generally pursued by the dentists at this time.

11 Q. Why did you resort to wood to destroy nerves when you had steel?

Same objection.

A. Steel, when it has to be so small that it will go to the apex
147 of the fang, if it is left soft it is very hard to manage; and, to be sure, we get it down there, because it will double on itself, and if you temper it, or attempt to temper it, and give it a spring temper the instrument is so small that you are never certain you have stopped its spring temper, but may have made it so hard that it will break off in the channel while you are using it; and therefore, at one period of my professional life, I made

many experiments to try and destroy the nerve in the channels by fibres of wood and quill reed—the outside of a fishing-rod reed shaved—and made very fine splinters of hickory shaved down; but they were none of them satisfactory, as they had to be so small, and the pulp being a semi-fluid substance, that the moment they touched the pulp they would become saturated with moisture and swell so as to fill up the channel and prevent your going down to the apex of the fang; so that it was developed that wood would not accomplish that object in very narrow and attenuated nerve channels, although it was faithfully tried in many instances. This diagram which I hold in my hand shows the inequalities of the nerve channel in many instances where they attenuate down to the size of a human hair by the contraction of the channel; but in contracting it generally spreads so as to make a flat, narrow fissure, channel, or cavity there, and in such cases as that the wood would never be strong enough to pass that to the apex. In the incisor teeth, where the channels are oftentimes clear, as in A, there wood answers a fair purpose; but, on account of the absorption of moisture that I have mentioned before, it is there impossible sometimes, even with a fair straight channel, to reach the apex. In the fangs of the bicuspids, and sometimes in the lateral incisors, the channels are attenuated, as they are in B, C, and D, so that even a very fine steel instrument, made as fine almost as a human hair, will scarcely pass, and in extirpating nerves the object is to cut the nerve off at the apex of the fang. If that is not done, the attempted destruction of it is a failure always. One reason why this method of destroying the nerves has been resorted to, and why it was considered a desideratum to destroy them in that way instead of using arsenic, is that when the nerve is cut off by an instrument at the apex of the fang—entirely severed from its outward connection—there is rarely any inflammation follows the extirpation of the nerve, whereas when arsenic is used to destroy it there is always more or less inflammation, which oftentimes extends through to the external periosteum and gives a great deal of serious trouble before that inflammation
148 can be reduced. Therefore there were many attempts made
to extirpate this nerve by incision at the apex, and wood was thought to be a good material until the experiment developed that in many cases it was impossible to reach the apex of the fang with wood, no matter how much it was attenuated.

12 R. D. Q. You have said that you employed wood in numerous instances to extirpate nerves from nerve channels and plugged the channels afterwards. About how many do you feel safe to say?

Same objection, and, further, as a manifest misstatement of the witness's testimony, and, further, as leading.

A. I should say that I have attempted to extirpate thirty or forty live nerves by means of particles of wood. As regards plugging the channels with wood, the only use of wood in plugging channels would be to have it take the place of gold, for the reason that if the channel could be filled by wood it could be easier introduced than strips of gold, which have to be so fine, so small, and introduced with so small an instrument that the operation is an exceedingly difficult one, requiring great patience and great mechanical delicacy of treatment. In attempting to fill with wood the first idea was that the wood being made very dry and placed in the cavity quickly, and with as much force as its size would allow, that would swell and fill the cavity up. The result of several attempts of that kind was that the wood, when it was saturated with the moisture that would be found in the channels, and by being in contact with the teeth, but not after the nerve was extirpated, would become very fetid and generate a poisonous gas, which was likely to be forced out of the foramen at the apex and cause severe inflammation of the external periosteum. If the wood was rendered antiseptic by saturating it with creosote or oil of turpentine, as a general thing it had not strength enough to be forced down any distance in the fang, and, being saturated with the fluid already, would not swell when it absorbed the moisture that it had received from the adjacent dental bone. That is one objection to its use. Another objection was—that is, you could not know beforehand what was the exact form of the channel that you were attempting to fill; that you had no guide by which you could adapt the wood in proper proportions to the size of the channel; so that wood, having those disadvantages, was found to be an unsatisfactory material with which to attempt to fill the nerve channels.

149 Same objection. The answer from the words "As regards plugging the channels with wood" is objected to as irresponsive. Notice of motion to strike the same from the record is herewith given on the final hearing of this cause.

13 R. D. Q. Nerve extirpation by wood is not painful, I suppose, to the patient?

Same objection.

A. Nerve extirpation by mechanical means—that is, the removal of a live nerve, whether by wood or any other substance—is one of the most excruciating tortures that can be imagined, and in the many times that I have attempted to do it I have never seen a patient that could sit still and allow me to do it. It had always to be done when they were unaware that you intended to do it, and would have to be performed with the speed of lightning, if possible, to have any chance to accomplish it in that way; but the advantages of extirpating a nerve by mechanical means were so great over its destruction by arsenic that where it was very important to avoid immediate inflammation the attempt to extirpate it by mechanical means has often been attempted.

Defendants' counsel offers the diagram used by this witness in evidence as "Defendants' Exhibit Rich Diagram."

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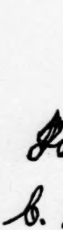
International Tooth Crown Co.
vs.
C. M. Richmond et al
Defts. Exhibit Rich Diagram.
J. M. R.
Special Exr.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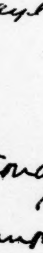
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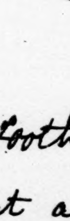
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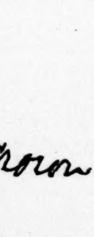
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By Mr. DICKERSON:

14 R. D. Q. In the Ravel, Watson, and Gabaudan operations you did not use any cement, then?

A. No.

Signature waived.

(Here follows diagram marked p. 150.)

151 NEW YORK, *April* 1, 1886.

Met pursuant to notice.

Present: John K. Beach, Esq., for defendants; E. N. Dickerson, Jr., Esq., for complainant.

Defendants' counsel puts in evidence certified copy of file wrapper and contents of letters patent granted to Cassius M. Richmond, No. 277,941, May 22, 1883, and No. 277,943, same patentee, May 22, 1883, and requests that the same be marked "Defendants' Exhibits Richmond Crown File Wrapper," "Richmond Process File Wrapper," respectively.

Defendants' counsel also offers in evidence certified copy of letters patent to Henry W. F. Buttner, No. 248,172, August 16, 1881, on the state of the art, and requests that the same be marked "Defendants' Exhibit Buttner Patent;" also letters patent granted Cassius M. Richmond, No. 224,355, February 10, 1880, and marks it "Defendants' Exhibit Richmond 1880 Patent."

Upon the state of the art defendants' counsel offers in evidence the following printed publications:

152 "Traite de la Partie Mécanique de l'Art du Chirurgien-Dentiste," published in Paris 1820, two volumes, and the same are marked "Defendants' Exhibit- 1 and 2" respectively.

"Practical and Familiar Treatise on Teeth and Dentism," by J. Patterson Clark, M. A., published at London 1836, and a particular reference to page 186 and to pages 220 to 251, and the same is marked "Defendants' Exhibit Clark."

"The Art of Preventing the Loss of Teeth," by Joseph Scott, dentist, published at London 1831, and particular reference to pages 60 to 69, and the same is marked "Defendants' Exhibit Scott."

"Lintott on the Teeth," London, 1841, with particular reference to pages 105 to 114 thereof, and the same is marked "Defendants' Exhibit Lintott."

"Parents' Dental Guide," by W. Imrie, London, 1834, with particular reference to pages 105 to 118, and the same is marked "Defendants' Exhibit Imrie."

"A Treatise on Crystalline Gold," by W. H. Dwinelle, published at Baltimore 1855, with particular reference to pages 27 to 37 thereof, and the same is marked "Defendants' Exhibit Dwinelle."

American Journal of Dental Science, January, 1879, published at Baltimore, with particular reference to page 425, and the same is marked "Defendants' Exhibit American Journal of Dental Science, Richmond."

The Dental Register, published at Cincinnati November, 1878, with particular reference to pages 4 and 482, and the same is marked "Defendants' Exhibit Dental Register."

"Fowll's Treatise on Dentistry," London, 1853, with particular reference to pages 76 and 79, and marks the same "Defendants' Exhibit Fowll's Treatise."

The Dental Cosmos, published in Philadelphia December, 1862, volume iv, No. 5, with particular reference to pages 243 to 245 thereof, and marks it "Defendants' Exhibit Dental Cosmos, Wood."

The Dental Cosmos, October, 1869, volume xi, No. 10, published at Philadelphia, with particular reference to pages 509 and 510 thereof, and marks it "Defendants' Exhibit Dental Cosmos, Bennett."

153 The Dental Cosmos, July, 1871, volume xiii, No. 7, published in Philadelphia, with particular reference to page 358, and the same is marked "Defendants' Exhibit Dental Cosmos, Essig."

The Dental Cosmos, August, 1872, volume xiv, No. 8, published in Philadelphia, with special reference to page 445, and marks it "Defendants' Exhibit Dental Cosmos, Fuller."

The Dental Cosmos, November, 1876, volume xviii, No. 11, published at Philadelphia, with particular reference to pages 586 and 587, and marks it "Defendants' Exhibit Dental Cosmos, Francis."

The Dental Cosmos, May, 1877, volume xix, No. 5, with particular reference to page 257, and marks it "Defendants' Exhibit Dental Cosmos, Bogue."

The Dental Cosmos, May, 1879, volume xxi, No. 5, published at Philadelphia, with particular reference to pages 261, 262, and 263, and marks it "Defendants' Exhibit Dental Cosmos, Kingsley."

The Dental Cosmos, September, 1879, volume xxi, No. 9, published at Philadelphia, with particular reference to page 510, and marks it "Defendants' Exhibit Dental Cosmos, Krouse."

The Dental Cosmos, December, 1879, volume xxi, No. 12, published at Philadelphia, with particular reference to pages 667 to 673, and marks it "Defendants' Exhibit Dental Cosmos, Webb."

The Dental Cosmos, August, 1880, volume xxii, No. 8, published at Philadelphia, with particular reference to pages 396 to 403, and marks it "Defendants' Exhibit Dental Cosmos, Litch."

The Dental Cosmos, September, 1880, volume xxii, No. 9, published at Philadelphia, with particular reference to pages 463 to 467, and marks it "Defendants' Exhibit Dental Cosmos, Talbot."

The Dental Cosmos, November, 1880, volume xxii, No. 11, published at Philadelphia, with particular reference to pages 623 to 624, and marks it "Defendants' Exhibit Dental Cosmos, Robinson."

154 "Transactions of the Tenth Annual Meeting of the Pennsylvania State Dental Society, New York, 1878," published at Lancaster, Pennsylvania, 1879, with particular reference to pages 21 to 43, and marks it "Defendants' Exhibit Pennsylvania State Dental Society."

"Transactions of the American Dental Association at the Nineteenth Annual Session, held at Niagara Falls, commencing on the 5th of August, 1879," published at Chicago in 1880, with particular reference to pages 42 to 45 thereof, and marks it "Defendants' Exhibit American Dental Association."

Patent Office copy of United States letters patent granted to J. B. Beers November 4th, 1873, No. 144,182, and marks it "Defendants' Exhibit Beers' Patent."

Defendants' counsel also offers said Beers patent in anticipation of the Richmond tooth-crown patent in suit, No. 277,941.

He also offers in evidence the "Defendants' Exhibits American Journal of Dental Science. Richmond," "Defendants' Exhibit Dental Register," and "Defendants' Exhibit Dental Cosmos, Kingsley," upon the defence of public use or sale of the invention described in letters patent No. 277,941 more than two years prior to the application therefor.

Objected to as manifestly irrelevant, immaterial, and incompetent

JOHN E. EARLE, a witness produced by and on behalf of the defendants, being duly sworn, deposes and says in answer to questions propounded by counsel for defendants:

1 Q. What is your name, age, residence, and occupation?

A. John E. Earle; fifty-five years of age; reside in New Haven, Connecticut; solicitor of patents.

2 Q. State what, if any, experience you have had which would qualify you to testify as an expert in patent causes.

A. For more than thirty years I have been engaged as solicitor of patents; during the early part of the time, or prior to 1862, in connection with mechanical drawing for the perfection of inventions and building of new machinery. Since 1862 I have been engaged exclusively in connection with patents, and since 1862 I have personally prepared more than seven thousand applications in the United States and foreign countries. This practice has necessitated
my frequently examining the state of the art to ascertain
155 novelty in inventions or the validity and scope of patents,
and also with reference to questions of infringement of mechanical constructions in prior patents. I have several times acted as one of a board of arbitration to ascertain the scope and validity and value of letters patent and inventions thereby secured and as referee, involving the same questions, and during the past fifteen years have testified in a large number of causes in the United States courts.

156 NEW YORK, *April* 2, 1886.

Met pursuant to adjournment.

Present: Same parties.

Direct examination of Mr. EARLE continued:

3 Q. Please look at copy of letters patent No. 277,941, to C. M. Richmond, being one of the letters patent in suit now shown you, and say — do you find to be the mechanical combinations described and shown and claimed in the said patent.

A. The patent referred to in the question relates to an improvement in artificial dentures, and particularly to that class which consists of a single crown to be set upon a root, prepared root, the object of the invention evidently being to protect the root to which the crown is attached from the action of the fluids of the mouth, or, in other words, to hermetically seal the joint between the root and the crown. The patent describes the invention as a cap adapted to cover the root of the tooth, the sides of the cap conforming to the natural contour of the exposed part of the root, and to which the crown is attached, and so that, when applied to the root and secured, the sides of the cap cover the end of the root and hermetically seal the joint between the root and the crown. The invention recited in the first claim, as I understand it, is an enclosing cap attached to the prepared root, the sides of the cap corresponding to the natural terminal contour of the root, and the said cap adapted to support an artificial denture. The invention recited in the second claim, as I understand it, is for the cap of the first claim, with an artificial porcelain or other crown supported by the cap, and the invention of the third claim includes the first claim, with the addition of a pin or other attaching contrivance extending upward into a cavity formed in the root as a means for securing the cap to the root. The invention of the fourth claim, as I understand it, is for the combination of a tooth crown, as porcelain, having a metallic backing soldered to the said crown, with a pin soldered to the backing, the said pin passing through a ferrule or band surrounding the inner end of the crown, the said ferrule adapted to surround the root. The invention recited in the second claim is for the 157 combination of an artificial crown, as porcelain, which forms the face or front of the denture, this crown being provided with pins upon its inner side, a backing plate secured to the tooth by means of the said pins, and a backing of metal alongside the said plate, and a ferrule or band around the inner end of the tooth or denture, the backing being united to the ferrule and to a pin which extends from the backing through the ferrule. The sixth claim, as I understand it, is for the combination of the crown with the same plate attached to it, and the same backing with the same pin, but omitting the ferrule and including the root in the mouth, with cement in the cavity prepared in the root and so as to secure the pin therein.

4 Q. Will you please look at the "Defendants' Exhibit Missouri Dental Journal," on the 184th and 5th pages thereof, and compare the operation there described with the structure described and claimed in the letters patent No. 277,941, to which your attention has been called?

A. I have examined the article referred to and find there described an artificial crown consisting of a cap enclosing the root, and to which an artificial denture is attached, and the said cap accurately fitted to the natural contour of the root in the mouth of the patient, the cap with the crown placed upon it and secured to the root in the mouth of the patient. In this article I find clearly described the enclosing cap attached to a prepared root for supporting an artificial denture, as described in the said Richmond patent, and particularly recited in the first claim thereof. I also find clearly described in the said article the combination of a prepared root, having its natural terminal contour near the margin of the gum, with an enclosing cap attached thereto and with an artificial crown supported by said cap, substantially as described in the said Richmond patent and particularly recited in the second claim thereof.

5 Q. Please look at "Defendants' Exhibit Beers Patent" and compare the artificial crown shown and described therein with the structure described and claimed in letters patent No. 277,941.

A. In "Exhibit Beers Patent" I find an artificial crown or denture which consists of a cap adapted to set over the root of the tooth and be secured thereto, and which crown, when attached, forms the artificial denture. As a cap placed upon the end of the prepared root and secured thereto, the cap is the same as that in the Richmond patent referred to. The Beers patent shows an enclosing
158 cap attached to the prepared root and forms an artificial denture. The Beers patent describes the cap as filled with the cement, but preparatory to the introduction of the cement "a small quantity of enamel can be first fused into the shell, so that when the gold crown or wearing edge of the gold shell wears through, a hard, permanent surface will still be preserved." In this case, therefore, the porcelain crown is inside the cap instead of outside, as described in the Richmond patent. The porcelain in the Beers cap is supported by the cap, and I therefore find described in the Beers patent the combination of a prepared root, having its natural terminal contour near the margin of the gum, and with an enclosing cap attached thereto, and with an artificial porcelain or other crown supported by said cap, substantially as described in the Richmond patent and particularly recited in the second claim. In the Beers patent the cap is secured by a screw or its equivalent set into the root, and upon which the cap is secured by means of the cement within the cap. I therefore find in the Beers patent the combination of the prepared root, having its natural terminal contour near the margin of the gum, with an enclosing cap attached thereto, the said cap being attached to the root by a pin or other suitable attaching contrivance passing upward and into a suitable cavity in the root, substantially as described in the Richmond patent and particularly recited in the third claim.

6 Q. Will you please look at "Complainant's Exhibit Richmond Old Operation" and say whether you find exhibited in that operation the structure described and claimed in the Richmond patent No. 277,941, in suit, giving your reasons for whatever conclusion you may express?

A. I have examined the exhibit referred to and I find therein a prepared root, having its natural terminal contour near what would naturally be the margin of the gum, with an enclosing cap attached thereto for supporting an artificial denture, as described in the said Richmond patent, and particularly recited in the first claim thereof. I also find in this exhibit the combination of a prepared root, having its natural terminal contour near what may be called the margin of the gum, with an enclosing cap attached thereto,

with an artificial porcelain or other crown supported by said cap, substantially as described in the said Richmond patent, and particularly recited in the second claim thereof. In the exhibit the cap is removable from the root, there being no cement between
the two. Therefore, when I say attached thereto I do not
159 wish to be understood as saying that in the exhibit it is ce-
mented thereto, but adapted to be cemented. I also find in
the said exhibit the combination of the prepared root, having its natural terminal contour near the margin of the gum, with an enclosing cap attached thereto, the said cap being attached thereto by a pin or other suitable attaching contrivance passing upward and into a suitable cavity in the root, substantially as described in the said Richmond patent and particularly recited in the third claim thereof.

It is not positively apparent how the tooth crown is secured to the metallic backing, but, as in the art, as I understand it, the more general method for attaching the crown to a backing is by means of solder, and, as in the exhibit, I find the appearance of solder between the backing and the tooth, and conclude that the metallic backing is soldered to the crown. I find in the said exhibit the combination of a tooth crown, a metallic backing soldered to said crown, and a pin firmly soldered to said artificial back and secured to and passing through a ferrule adapted to surround the root, substantially as described in the Richmond patent and particularly recited in the fourth claim thereof.

From the exhibit it is impossible for me to determine whether or not the crown is provided with attaching pins as a means for attaching the crown to the backing plate. I am unable to say whether this exhibit embodies the invention recited in the fifth claim or not, and I am also unable to determine whether there is a protecting plate between the crown and the backing, as indicated in the said fifth claim and as also referred to in the sixth claim. I am for this reason unable to say whether this exhibit embodies the invention recited in the fifth or sixth claim. I take into consideration the fact of the reference to hermetically sealing referred to in the specification; but this I do not consider material to either of the claims, as neither specify or refer to hermetically sealing; yet the cement which is necessarily employed in securing the artificial crown to the root will produce the hermetically sealing between the cap and the root, and such hermetical sealing will necessarily follow the application of the crown to the root in this exhibit, as it would in the operation described in the article in "Defendants' Exhibit Missouri Journal," and which would also be the result in the process of attaching described in "Exhibit Beers Patent."

In the "Exhibit Richmond Old Operation" I observe that the
upper end of the porcelain crown is exposed inside the cap
160 and forms a part of the bottom of the cap, whereas in the
illustrations of the Richmond patent the upper end of the
porcelain crown forms no part of the bottom of the cap; but this I do not consider an essential difference. As I understand it, the cap of the Richmond patent is none the less the cap described and

claimed by him irrespective of the material which forms the bottom of the cap, it only being essential that there shall be a cap adapted to so embrace the end of the root as to enable the joint to be hermetically sealed.

7 Q. Please look at "Defendants' Exhibit Searles No. 1 and Searles No. 2," respectively, and compare them with the structure described and claimed in the Richmond patent, and state briefly the result of that comparison.

A. I find in "Exhibit Searles No. 1" an artificial crown, consisting of a cap adapted to embrace the exposed end of the root and conforming to the natural contour thereof, the said cap carrying a porcelain artificial crown, and secured to the root by a pin fixed in the metal backing, and extending through the cap, or what is called in the patent a "ferrule," into a cavity in the root and there secured, and the joint between the cap and root hermetically sealed by cement, and, as I understand it, identically as shown and described in the Richmond patent and particularly recited in the first, second, third, and fourth claims thereof; but, for the reasons stated in reference to the attachment of the porcelain crown to the backing in "Exhibit Old Operation," I am unable to say whether in this "Exhibit Searles No. 1" there is the invention recited in the fifth and sixth claims of the Richmond patent. In this "Exhibit No. 1" I observe that the bottom of the cap is of metal at the front or adjacent to the porcelain crown, the porcelain crown itself apparently not extending into the cap as in the "Exhibit Old Operation," and therefore making this "Exhibit Searles No. 1" substantially identical with the construction illustrated and described in the Richmond patent. Of this "Exhibit Searles No. 1" it should be said that a portion of the back or inner side has been ground away to expose the connection between the root and the cap, and the porcelain crown has also been ground away at its upper end to show the metallic bottom of the cap. In the "Exhibit Searles No. 2," referred to in the question, I find a crown and a part of the root firmly secured together. There is a cap at the junction of the crown and root, evidently the natural contour of the root, and which surrounds the exposed portion of the root, and with a pin extending through the cap into a cavity in the root, substantially as described in the Richmond
161 patent and particularly recited in the first, second,
third, and fourth claims thereof, but for the reasons therefor given I am unable to say whether or not the exhibit embodies the invention recited in the fifth and sixth claims.

8 Q. Please look at copy of letters patent No. 277,933, to A. S. Richmond, being one of the letters patent in suit, and say what you understand to be the mechanical structure described and shown and claimed in said letters patent.

A. I find in the patent referred to an artificial denture which consists of a metal bar to which several artificial crowns are attached, the said bar provided with two or more caps adapted to embrace the exposed ends of the corresponding roots in the mouth prepared to receive the said caps, and upon which the said caps will bear as a support for the bar and the teeth they carry, the said caps and roots being distant from each other, so that the said bar forms a bridge extending in from one root to the next. I understand the invention recited in the first claim to be for a metallic bridge extending from one root to another in a mouth, there being a space between the two with artificial teeth attached to the said bridge, and the bridge provided with two or more caps adapted to rest upon the said roots, and whereby the said roots (or may be teeth), through the said caps, become the sole support for the said bridge and the teeth which it carries, and so that the said intermediate teeth receive no support from the gums beneath. I understand the second claim to include the invention recited in the first claim, with the qualification that the metal bridge extends upward over the artificial crowns so that the bar itself constitutes the masticating portion of the denture, in contradistinction to the artificial crowns taking that bearing. I understand the third claim to be for the same invention as the first claim, with the two or more caps by which the bridge is supported secured to the ends of the natural teeth or roots by some kind of fastening device.

9 Q. Please compare the operation described in "Defendant's Exhibit American Journal of Dental Science, Eliot," with the structure described and shown in letters patent No. 277,933, in suit, and say what resemblances and differences you find between them.

A. The article referred to is that to which I referred to in a previous answer. The bridge supporting the teeth illustrated and described in that article differs from that shown and described in the said Richmond patent in the method of support. In the article the bridge is described as supported on the ends of the roots.
162 The bridge in the Richmond patent is supported on the ends of the roots by a projection or extension from the bridge adapted to rest on the ends of the roots substantially as in the Eliot article; but while in the Eliot article pins or pivots are attached to the bearings of the bridge and so as to enter corresponding cavities in the teeth as a means for securing the bridge and preventing lateral movement, in the Richmond patent the bearing parts of the bridge are made in the form of caps and so as to embrace the root and thereby prevent lateral movement, and by such embracing of the root the caps may be secured thereto. Otherwise than in the means of securing and preventing lateral movement, the bridge in the Eliot article is substantially the bridge shown and described in the Richmond patent and particularly recited in the first claim thereof; and because the invention recited in the third claim of the Richmond patent includes any means for fastening the ends of the bridge, I find in the said Eliot article the invention recited in the said third claim of the Richmond patent, except as to the cap-shaped supports referred to in regard to the first claim.

10 Q. In order to bring out the practical difference between the attachment of the artificial bridge-supported tooth, when it is supported by the Richmond method and when it is supported by the Low method, I will ask this question: Suppose it were desired to insert upon the Richmond plan a single tooth supported by a bridge, how many artificial dentures, meaning by that how many separate

artificial teeth, would be required to be placed in the patient's mouth?

A. Three—the tooth to fill the space and a tooth upon each cap which cover respectively the adjacent roots.

11 Q. Now, suppose it were desired to insert a single tooth upon a bridge attached by the Low method, how many artificial teeth would be required to be inserted in the patient's mouth?

A. One, owing to the fact that whereas in the Richmond patent the bridge necessarily takes its support on the top of the adjoining roots, which must be prepared to receive that bearing, in the Low patent the bridge terminates at each end in a ring or band which is adapted to embrace the adjacent teeth, the said adjacent teeth in this case requiring no preparation, as the bridge is supported not upon the end but by the embracing of the sides. In this respect the Richmond would be the same as the Eliot, and the Low would be the same as the Bing, because Bing makes connection with adjacent teeth already standing in the mouth.

163 12 Q. Please look at "Complainant's Exhibit Prenot Teeth" and "Exhibit Base for Supporting Prenot Teeth," with especial reference to the caps or cups, which in that exhibit fit over the canine, and the lateral stumps upon the "Exhibit Base," and compare those caps or cups with the caps or cups shown in the Richmond patent, 277,933, pointing out such resemblances or differences as you may find.

A. In the Richmond patent the caps referred to show a pin or pivot adapted to enter cavities prepared for them in the corresponding roots. Otherwise than this difference, I understand them to be substantially alike.

13 Q. So that if you cut off all this part of the bridge in the Prenot teeth which extends back of the canine on one side and back of the lateral on the other the remaining structure would, in your judgment, be within the patent No. 277,933; is that so?

A. Yes, sir; it would be a fair illustration of the invention recited in the first and second claim of that patent, but would not include the second claim for the reason that the artificial crowns constitute the masticating portion of the denture.

Defendants' counsel offers in evidence certified copy of United States letters patent to L. F. Shepard, No. 9587, February 15, 1853, and marks it "Defendants' Exhibit Shepard Patent."

Defendants' counsel offers in evidence a set of porcelain teeth mounted upon a strip of plastic material and requests that the same be marked "Defendants' Exhibit Plate Teeth."

14 Q. Are you sufficiently familiar with the state of the art to say whether or not teeth substantially like "Defendants' Exhibit Plate Teeth" have been known and used in the art of dentistry for any considerable length of time?

A. I am; have known such for many years.

Defendants' counsel reserves the right to put in evidence a copy of "Harris on Dental Surgery" on the state of the art.

(Signature waived.)

164 NEW YORK, *April* 13, 1886.

Met pursuant to notice.

Present: Same parties.

Defendants' counsel offers in evidence No. 7 of volume xii of the Dental Cosmos, published at Philadelphia, 1866, with special reference to pages 361 to 364 thereof, and the same is marked "Defendants' Exhibit Cosmos, Weatherby."

Also No. 1 of volume xi of the Dental Cosmos, published at Philadelphia January, 1869, with special reference to page 5 thereof, and the same is marked "Defendants' Exhibit Cosmos, Blake."

Also No. 12, volume xiv, Dental Cosmos, published at Philadelphia December, 1872, with special reference to page 678 thereof, and the same is marked "Defendants' Exhibit Cosmos, Davis."

Also Dental Cosmos No. 2, of volume xv, published at Philadelphia February, 1873, with special reference to pages 110 and 111 thereof, and the same is marked "Defendants' Exhibit Cosmos, Trujillo."

Also No. 12 of volume xv of the Dental Cosmos, published at Philadelphia, 1873, with special reference to page- 657, '58, and '59, and page 666 thereof, and the same is marked "Defendants' Exhibit Cosmos, Phillips."

Also No. 7 of volume xvi, published at Philadelphia July, 1874, with special reference to pages 358 to 367 thereof, and the same is marked "Defendants' Exhibit Cosmos, Foster."

Also No. 12 of volume xvi, published at Philadelphia, 1874, with special reference to pages 642 to 644 thereof, and the same is marked "Defendants' Exhibit Cosmos, Van Marter."

165 Also No. 11 of volume xvii, November, 1875, with special reference to pages 604 to 608 thereof, and the same is marked "Defendants' Exhibit Cosmos, Chupein."

Also No. 9, volume xix, published at Philadelphia September, 1877, with special reference to pages 481 to 487 thereof, and the same is marked "Defendants' Exhibit Cosmos, Bondwell."

Also No. 4 of volume xxi, published at Philadelphia April, 1879, with special reference to page 232 thereof, and the same is marked "Defendants' Exhibit Cosmos, Leach."

Also letters patent of the United States No. 164,913, to W. H. Gates, dated June 29, 1875, and the same is marked "Defendants' Exhibit Gates Patent."

All of the above exhibits relating to the exhibits as to the state of the art.

Cross-examination of JOHN E. EARLE by E. N. DICKERSON, Jr., Esq.:

15 X Q. Referring more specifically to your eleventh answer, you do not mean to say that if the claims of the C. M. Richmond patent No. 277,941 be limited to the operation shown in the patent, namely, a method of supporting an artificial porcelain crown upon a prepared root and producing a hermetically sealed denture around the

end of that prepared root, you would find either in "Defendants' Exhibit Missouri Dental Journal" or in "Defendants' Exhibit Beers Patent" the invention so limited, do you?

A. If an artificial denture be a substitution for or in place of an original tooth attached to the root of that tooth, and so that the part, whatever it be called, take the place of and act in the mouth as the perfect tooth would have done, and which is, as I understand it, an artificial denture, then I do find in the Missouri Journal such an artificial denture, its base being in the form of a cap to enclose so much of the tooth or root as is exposed, completely cover the joint, and, by the interposition of cement, to hermetically seal that joint, and, under this understanding of the first claim of the patent and of the operation described in the Missouri Dental Journal, I do find in that article a full and complete anticipation of the invention described and so recited in the Richmond patent. If, on the contrary, an artificial denture necessarily imply that it shall be made 166 from different materials—that is, the cap which encloses the root and the crown, say, of gold and the crown of porcelain attached thereto—then I should not find such a denture in the article in the Missouri Journal, as undoubtedly the denture in that case was gold. The same answer applies to the Beers patent. Just what the preparation of the root in the article in the Missouri Dental Journal was I am unable to state; but there is nothing said in the Dental Journal as to what the special preparation of the root to receive the artificial denture was. In the Beers patent the specification says: "To apply this shell or crown I first clean away the decayed portions of the old tooth," etc. As represented in the drawing of the Beers patent, it does not appear that there is the same levelling of the tooth as exhibited in the Richmond patent.

16 X Q. In your 12th answer you have made some reference to a pin as part of the Beers artificial denture. As a matter of fact there is no pin forming an integral part of that denture as prepared outside of the mouth for application in the mouth, as is the case in the Richmond operation, but there is simply a headed pin or screw which is first inserted in the root, and the use of which is to enable the cement which may be placed around it when the denture is put in the mouth to hold more firmly against the root by reason of the cement embracing the end of the pin or screw. That is the fact, is it not?

A. You are correct in your statement of the application and combination of the pin with the crown and root, as described in the Beers patent.

Signature waived.

Sworn to before me—

[SEAL.] JOHN W. RIPLEY,
Notary Public, N. Y. Co., Special Ex'r.

NEW YORK, *April* 3, 1886.

Met pursuant to notice.

Present: E. N. Dickerson, Jr., Esq., counsel for complainant; S. J. Gordon, Esq., counsel for defendants.

Continuation of cross-examination of Dr. CASSIUS M. RICHMOND by Mr. E. N. DICKERSON, Jr.:

85 X Q. Please look at the "Exhibit Richmond-Sheffield Operation, June 24, 1885," and state whether you have any recollection of that operation.

167 A. Yes, sir; I made this, if it is the one that is the original.

86 X Q. Will you please state the circumstances in connection with the making of that operation—where it was made and how it came to be made?

A. I made this operation in New London, Connecticut. I made this operation for Dr. W. W. Sheffield, as a large model to explain the idea to patients.

87 X Q. Do you remember the circumstances under which you happened to make that operation, which differs from "Exhibit Richmond Old Operation," to which you have testified, in this, that the cap is solid beneath the root, being first made so as to enclose the root hermetically before the addition of the porcelain?

A. This "Exhibit Richmond-Sheffield Operation" being made as a model, the cap was put clear across the top.

88 X Q. What was the purpose of continuing that cap and soldering it tight outside of the mouth, and before application?

A. I do not know that any idea was in my mind at the time that this was made. I remember Dr. Sheffield saying something about it when I gave it to him as a model.

89 X Q. Do you remember a difficulty occurring at about that time with a patient of Dr. W. W. Sheffield's by reason of the action of the saliva upon the cement in operations like those you had been previously making and in which the cap was not hermetically sealed?

A. Yes, sir; we talked of an operation that was made there in New London at the time.

90 X Q. And was it not as the result of that difficulty that you commenced the making of the operation substantially as shown in "Exhibit Richmond-Sheffield Operation"?

A. I think it was.

91 X Q. Do you remember anything about Dr. William N. Morrison, of St. Louis, coming to Dr. Sheffield's office in New York?

A. Yes, sir; Dr. Morrison called at the office in Thirty-second street while we were in partnership.

92 X Q. Will you state for what purpose, apparently, Dr. Morrison came at that time, and what happened during his interviews or visits there?

A. Well, I suppose it was curiosity on the part of Dr. Morrison to see a large establishment, as thousands of other dentists called there.

93 X Q. Was there any explanation made to Dr. Morrison 168 at that time of the operations which were then being practised by you and your partner there?

A. The usual courtesy was extended to Dr. Morrison that was extended to every dentist who called there at our office.

94 X Q. Were such operations as you were doing there in tooth crowns at the time shown and explained to him?

A. Yes, sir; Dr. Sheffield showed Dr. Morrison everything that we had there.

95 X Q. Did Dr. Morrison at that time claim to have been the inventor of the processes which you were then practising?

A. No, sir; he did not.

Cross-examination closed.

Redirect examination by Mr. GORDON:

96 R. D. Q. Do me the favor to state the order in which, in the course of the development of the Richmond tooth crown, you made use of tubes, screws, round, triangular, and square pins, and state why the devices and the forms thereof changed from time to time.

A. When I first commenced making crowns the tube was a tube of gold made by myself. It seemed to be the only thing available at the time. Afterwards a round wire was substituted for that when it was found in the market. After my first crown patent the screw came into market. Then that was used. Then after that the square wire was substituted for the round wire and for the tube, and substituted for all other pins, in fact.

97 R. D. Q. That your testimony may be clearly understood, I will ask you to explain *seriatim* the differences between the Kallock operation, the Saffold operation (both as performed by you in San Francisco in 1875 or 1876), and the Saffold operation in New York, which superseded in Saffold's mouth the old San Francisco Saffold operation, more especially as regards the extension of the gold floor, so to speak, over the root of the tooth upon which the crowns were placed?

I apprehend there will be no objection to your using the little diagrams, which I hand you, in your answers, as they were made by yourself.

(Hands witness diagrams.)

169 Objected to, if by this question the witness is to be induced to contradict his previous testimony. The operations already in evidence speak for themselves and require no further explanation.

Mr. Gordon states that Dr. Richmond, in reading his testimony, as given before, for the first time, as he understood it this morning, he pointed out language in one or two answers which, connected with the precise language of the interrogatories, did not seem to him to leave it as he meant it to be understood.

Dr. RICHMOND (interrupting): That is in one single question.

Mr. Gordon (resuming): Thereupon Dr. Richmond drew the diagrams and explained to me what he meant. I thought it due alike to the parties, the counsel, and the court, as well as to Dr. Richmond himself, that he should have an opportunity to place himself upon the record as he wished to appear.

A. (The witness referring to the drawings.) The Kallock operation—before the soldering took place gold-foil was packed into this band; then the hole was covered with gold-solder; the pin was a round tube. In the Saffold operation the gold-foil was packed into the gold band; the pin was a round tube. In the operation for Saffold, as replaced, the pin was square; the floor of the plate gold was used for receiving the solder instead of foil, and at the bevel the crown was open instead of being closed. The porcelain went down and covered up the hole through the bevel of the crown.

98 R. D. Q. Do those diagrams correctly represent the three operations and the position of the gold between root and crown respectively in the three operations?

A. Well, they represent them so that I could explain it to anybody, but not so that anybody could look it over and see what it means.

99 R. D. Q. Do the letters of reference correctly represent the positions of the gold as between root and crown, as detailed by you and as manifested in the three operations?

A. Yes, sir.

The three diagrams are offered in evidence by defendants' counsel,

(Here follow diagrams marked pp. 170, 171, & 172.)

173 to be marked respectively "Defendants' Exhibit Kallock Diagram, San Francisco;" "Defendants' Exhibit Saffold Diagram, San Francisco;" "Defendants' Exhibit Saffold Diagram, New York."

100 R. D. Q. How long before doing the Saffold operation in New York had you, in mounting tooth crowns according to the Richmond system, practised the method shown in the Saffold New York operation, as shown in diagram "Saffold New York?"

Objected to as not redirect, and the attention of the court is called to the attempt of counsel by this alleged redirect examination to make an entirely new and different case to anything heretofore attempted, and the conclusion therefrom to be drawn.

A. I think the Saffold operation was about the first of the operations where the square pin was used. The "Exhibit Imlay Crown" was made two years previous, I think. That is the same as the Saffold New York operation, except it had a hollow screw instead of a square pin.

101 R. D. Q. Leaving out the matter of pivots—that is, tube screws or pins—so far as gold floor, as I have called it, is concerned, was or

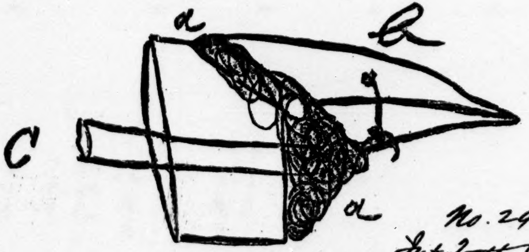
170

Kallock. "1.

a gold foil forming gold floor
b porcelain front

C pin
or table

Int. Tooth Crown Co
vs
Richmond
Defendants Exhibit
Kallock diagram
San Francisco
J.W.R. Sp Exr



No. 294.
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Gaylord et al } p. 170

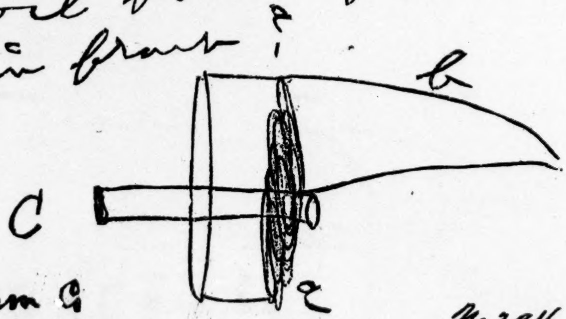
171

Safford,

a gold foil forming gold floor

b porcelain frame

C pin
or
tube



Int. Tooth Crown Co
vs
Richmond

Defendants Exhibit

Saford diagram

San Francisco JMR: at Ex

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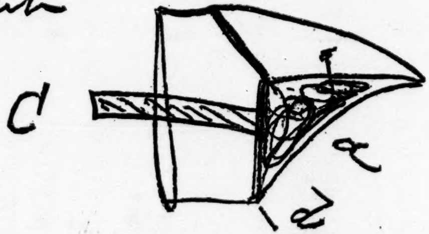
Saffold new operation

a gold foil

b porcelain front

c pin

d gold floor



Int Tooth Crown Co
v
Richmond

Defendants Exhibit
Safold diagram
New York. J.W.R. Sp Exr

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not the form of gold floor shown in the Saffold New York operation practised by you at a very early date and before you came to New York to illustrate your inventions in tooth crowns?

Objected to as not redirect, and the attention of the court is called to the attempt of counsel by this alleged redirect examination to make an entirely new and different case to anything heretofore attempted, and the conclusion therefrom to be drawn, and, further, as grossly leading.

A. The same general features are practised. I referred to the Imlay case, as that was in evidence and could be seen.

102 R. D. Q. Question repeated.

Same objection.

A. It was two years old. That case goes back two years. I cannot remember any particular case to refer to. I simply refer to that because it was in the case.

174 103 R. D. Q. When were they practised?

Same objection.

A. I have referred to that case. They were practised in Chicago and New London.

104 R. D. Q. In Chicago like the diagram Saffold New York before you came to New York?

Same objection.

A. Yes, sir—

(The witness referring to "Exhibit Imlay.")

That has a bevelled porcelain, but there is no floor under the porcelain bevel.

Recross-examination by Mr. E. N. Dickerson, Jr.:

Counsel for complainant states that, in view of the fact that a totally different case is developed at this stage of the proceedings for the first time, concerning which he has no information, and in view of the fact that Mr. Edmonds, his associate in the case, and Dr. L. T. Sheffield, who has special knowledge of these matters, are now in St. Louis, occupied in the taking of testimony there, as he is informed, it will be impossible for him to finish the cross-examination of this witness to-day; but he will ask a few questions.

105 R. X Q. Mr. Gordon has suggested that you desired to correct certain part of your previous testimony. I now hand you that testimony. Please indicate any answers which you desire to correct and what such correction is.

(Hands witness copy of testimony.)

A. That is as to cross-question 49, which makes me say that that was the first operation in which I bevelled a band.

106 R. X Q. Excepting in that answer, is the whole of your previous testimony true, as you now are informed and believe?

A. It is, so far as anything I can discover in it.

107 R. X Q. It is, then, true that the first hermetically sealed cap, enclosing the end of the root, made by you was made while
175 you were working with Dr. W. W. Sheffield in New London, is it not?

A. I think that was the first place where I put a cap directly across the end of the band and soldered it on.

108 R. X. Q. And the previous answer is a correct statement in that regard?

A. So far as I am able to state.

Adjourned subject to the return of Mr. Edmonds.

NEW YORK, *April* 9, 1886.

Met pursuant to notice.

Present: E. N. Dickerson, Jr., Esq., for complainant; S. J. Gordon, Esq., for defendants.

Continuation of recross-examination of Dr. C. M. RICHMOND by E. N. DICKERSON, Jr.:

109 R. X Q. Is it your recollection that the visit of Dr. Morrison to which you have referred at Dr. Sheffield's office occurred in the year 1881?

A. I think it was. It was when he arrived here from his trip abroad.

110 R. X Q. On that occasion did Dr. Morrison seem to exhibit considerable curiosity and interest in the investigation of the crown operations then being performed at your office?

A. Yes, sir; the same as all other dentists that came in there.

111 R. X Q. You have made some reference to the placing of gold-foil in the tubes or ferrules surrounding the roots in operations performed by you. Was that foil put in position from behind and underneath the porcelain crown after the ferrule was removed from the mouth and the porcelain crown was invested in position?

A. Yes, sir; the foil was packed in just previous to the soldering of the two together.

112 R. X Q. Your intention in placing that foil there was for the purpose of enabling the solder to be flowed in to connect the pin entering the root, the ferrule, and the back of the porcelain tooth crown, was it not?

176 A. Yes, sir.

113 R. X Q. The mere placing of that foil in the position in which you placed it in your operations would not make a closed cap of itself, would it?

A. No, sir.

114 R. X Q. And even after the solder was flowed upon it that solder could not penetrate to the front joint where the porcelain met the ferrule so as to make a closed cap there, could it?

A. No, sir; the solder would not penetrate the foil through there.

115 R. X Q. I understand further from your testimony heretofore given that after you had experimented with that foil in various

ways, as you have detailed, you substituted for that foil as a means of obtaining the same solder attachment a half plate or half floor within the ferrule, which floor did not extend to the front of the ferrule. Is that the effect of your testimony?

A. Yes, sir.

116 R. X Q. Your intention, then, was not, in the performance of either of those operations, to make the hermetically sealed cap now referred to in the patent, was it?

A. No, sir.

117 R. X Q. As a matter of fact, I understand that at some time you may have put in a loose floor of platinum or gold previous to your invention of the hermetical soldering of the cap outside of the mouth, in which case, after dropping this plate in position within the ferrule, you then likewise would flow in solder from behind the porcelain so as to make a soldered union between the pin, the plate, the ferrule, and the back of the porcelain. Do I state correctly this operation?

A. Yes, sir.

118 R. X Q. In that case likewise the hermetically sealed cap would not be formed by the solder, for the reason that in that method of application the solder could not unite in the front of the ferrule, but would simply serve to unite the parts to which I have made reference so as to make a solid denture. That is the fact, is it not?

A. Yes, sir.

119 R. X Q. In view of this testimony, is it not, then, a fair statement to say that from the commencement of your conception of this invention until the time when you completed it in the office of W. W.
Sheffield, in New London, you were constantly trying to im-
177 prove it, and were, in fact, altering your methods of making
the operation until you reached the perfection of the patent?

A. Yes, sir; changes were made in it every year.

120 R. X Q. And, as a matter of fact, if the invention of the patent be for a hermetically sealed cap, you never made that cap until the time when you made it in the office of W. W. Sheffield in New London; that is true, is it not?

A. Yes, sir; I never practised it in my daily practice.

121 R. X Q. And such cap was never put into any operation in any patient's mouth so far as you now know, was it, until that period?

A. I do not remember ever putting in a perfectly sealed cap until that time.

122 R. X Q. And you did not so instruct Dr. Gaylord at New Haven, did you?

A. No, sir; I did not.

By Mr. GORDON:

123 R. D. Q. How happened it that you made the metal plate cap, so to speak, at the office of the senior Sheffield at New London; why was that form adopted instead of the previous forms of embodying your crown invention at that time?

A. Dr. Sheffield asked me to make him a model to put in his pocket, and gave me the porcelain, which was a large one. I made the band and soldered the cap on, and, as it was not to go in the mouth as a practical operation, I waxed the porcelain on and finished it right up hurriedly; that was the reason of that.

124 R. D. Q. In your judgment, is there any difference in principle between the crown-work done by you in San Francisco, as you have testified, in the mouths of Kallock and Saffold, and from that time for a number of succeeding years previous to the time when you used the sealed cap for the purpose of illustration at Dr. Sheffield's office in New London, as you have stated?

Objected to as immaterial, irrelevant, and incompetent, and as grossly leading.

A. They were very similar; the mechanical construction was somewhat changed.

By Mr. Dickerson, Jr.:

178 125 R. X Q. I find in the patent issued to you, and to which you made oath, this statement: "It will be seen that when this denture is applied to a root the end of the root is entirely protected from the injurious action of the fluids of the mouth, and is hermetically sealed, being covered by a closed cap. This enclosing cap is of the greatest importance, because otherwise decay must necessarily take place by reason of the action of the fluids of the mouth on the exposed dentine, and the denture would become useless. By this arrangement, therefore, both the end of the root and so much of the same as might otherwise be exposed to the fluids of the mouth are hermetically sealed, and the root is thus protected from the injurious effect which would otherwise result from the action of the fluids. * * * The caps hereinbefore described are so constructed, as set forth, as to cover an enclosed prepared end of the root, wholly excluding the juices of the mouth therefrom, and preventing the decay that would otherwise result." Are not those statements in fact true?

A. That is considered the most approved operation, I believe.

126 R. X Q. As a matter of fact, then, those statements being true, there is that marked improvement, being the thing specified in that patent, over operations performed by you previous to your completion of that operation; that is the fact, is it not?

A. It makes the most perfect crown.

127 R. X Q. And the statement of my last question is in fact true, is it not?

A. Yes, sir.

By Mr. Gordon:

128 R. D. Q. Who drafted the specification of letters patent No. 277,941, from which quotations have just been read to you by my opponent?

A. I think it was either Dickerson & Dickerson or Edmonds, I don't remember which at present.

129 R. D. Q. If I remember your testimony-in-chief correctly, you stated that your earlier operations, such as exemplified in Kallock's mouth and Safford's, and proclaimed to the profession in many clinics, were practically successful, and stood the test of years of usage?

Objected to as leading.

179 A. Yes, sir; that is a fact.

Signature waived.

Sworn to before me—
[SEAL.]
JOHN W. RIPLEY,
Notary Public, N. Y. Co., Special Ex'r.

Circuit Court of the United States for the Southern District of New York.

INTERNATIONAL TOOTH CROWN COMPANY
vs.
EDWARD S. GAYLORD *et al.*
In Equity.

Deposition of Thomas C. Stellwagen, taken before me, Richard S. Child, Jr., a notary public in and for the city and county of Philadelphia, State of Pennsylvania, on this 14th day of April, 1886, at 901 Walnut street.

THOMAS C. STELLWAGEN, a witness called on behalf of defendants, being duly sworn, deposes as follows:

1 Q. What is your name, age, residence, and occupation?

A. Thomas C. Stellwagen; age, forty-five; Media, Pa.; am a dentist.

2 Q. Do you know Dr. A. S. Richmond?

A. I do.

3 Q. Did he ever do any work in your mouth?

A. He did.

4 Q. When and under what circumstances?

A. At a clinic held at my office, in this city, in the month of February, 1879.

5 Q. Describe exactly what that operation was and how it was constructed.

A. The roots of the teeth, left superior first and second bicuspid, were first ground down nearly to a level of the gum. Gold bands were fitted tightly around the natural roots and soldered at
180 the joint. Upon this was soldered a piece of the same plate, making a cap, upon which subsequently was built a solid gold crown composed of buttons formed of the melted scraps, which were held in position by gold solder; the hole then fashioned by filing to the shape of the tooth. These were inserted (after articulating with the jaws closed) by means of the ordinary dental cement—probably chloride of zinc.

6 X Q. Was there any vent left through those crowns for the escape of the cement when they were put into position?

A. My recollection is, at first there was not, but that subsequently a hole was drilled for that purpose.

7 X Q. That was done, of course, before the insertion and operation, so as to allow the escape of the cement when it was put into position, was it not?

A. Yes; when it was done.

THOS. C. STELLWAGEN.

Sworn and subscribed to before me this 14th day of April, A. D. 1886.

[SEAL.] RICHARD S. CHILD, JR.,
Notary Public.

STATE OF PENNSYLVANIA, }
City and County of Philadelphia, } *ss:*

I, Richard S. Child, Jr., notary public in and for city and county of Philadelphia, do certify that the foregoing deposition of Thomas C. Stellwagen was taken on behalf of C. M. Richmond *et al.* before me, at the office of George Harding, Esq., northwest corner Ninth and Walnut, April 14, 1886.

That said witness was duly sworn by me before the commencement of his testimony to tell the truth, the whole truth, and nothing but the truth; that the testimony was written out by me; that the opposing party was represented during the taking of said testimony by its counsel, E. N. Dickerson, Jr., and that I am not connected by blood or marriage with either of said parties or interested, directly or indirectly, in the matter in controversy.

In testimony whereof I have hereunto affixed my hand and official seal this 14th day of April, A. D. 1886.

[SEAL.] RICHARD S. CHILD, JR.,
Notary Public.

181 NEW YORK, *April* 21, 1886.

Met pursuant to notice.

Present: Same parties.

EDWARD S. GAYLORD recalled.

Continuation of cross-examination of Dr. EDWARD S. GAYLORD by Mr. DICKERSON, Jr.:

46 X Q. Will you please state how you made the first Searles operation? Describe the operation fully.

A. Well, I answer that question in this way by beginning at—because I can't say positively whether the root was broken and badly decayed and broken or not; my memory don't serve me; but after preparing the teeth in the usual way I fitted a gold band in the usual manner. After that was fitted and soldered, properly shaped, I then fitted and soldered a platinum or gold—either platinum or gold; my memory don't serve me because my custom was to change and use one metal or the other, but a metal of either gold or platinum—cap, which constituted a floor there on that band; that was then applied to the root and the porcelain ground in a proper manner to fit this cap. The post was adjusted, wax 182 was used to hold the porcelain, which was previously backed with gold; wax was used there, as I said before, to hold that in proper position. It was then removed, invested, and soldered.

47 X Q. Will you please describe how you made the second Searles operation?

A. In precisely the same way.

48 X Q. This platinum or gold floor to which you refer was in both cases cut out so as to exactly fit the inside of the band, as I understand?

A. No, sir; it was not. It was cut by placing the thin metal on the top of the band and then by making an indentation with the finger or against the cork or by some convenient method; I got the shape of that thin metal to the band by that pressure. I then cut it to that form, but it overlaps the entire top of the band. It did not go inside of the band; it lies on the band and is there soldered.

49 X Q. It covers, then, the entire end of the band in both those operations?

A. Yes, sir.

50 X Q. This was a solid floor in both cases, as I understand?

A. It became a solid floor after soldering it to the top of the cap—that is, a floor for the porcelain to rest upon.

51 X Q. I mean, was it continuous over the centre of the cap?

A. Entirely.

52 X Q. How, then, could the pins which enter into the root pass through the floor if the floor was so continuous?

A. By being pierced with an instrument of some kind of sufficient size to allow the pin to pass through.

53 X Q. You pierced the floors, then, after you put them in the cap, did you?

A. Always.

54 X Q. Have you any recollection as to whether you used platinum or gold in either of these cases?

A. My custom—when I first began, I used platinum more than gold, because, not being familiar with using as thin a metal as gold must necessarily be there or any metal, there was great difficulty in fusing the solder and on melting the gold where I used gold, but I cannot say—I alternated as my preference seemed to lead me, without any particular reason for it beyond that—if a piece of platinum, I used that; if there was a piece of gold that seemed convenient, I used that.

183 55 X Q. How did you make the model of the operation which you put into this case and which is marked "Defendants' Exhibit Gaylord Model?" I refer to the tooth without a screw in respect to the floor.

A. In the same manner as I have described.

56 X Q. And what metal did you use in that?

A. In this exhibit?

57 X Q. In this exhibit for the floor.

A. My impression is it is gold.

58 X Q. What is the thickness of the gold plate which you used in making those floors?

A. Oh, it must range from 30 to 33.

59 X Q. And of platinum, what?

A. The same. The metal there is not intended to be thicker than ordinary writing paper; not as thick. In using gold I always used pure gold for that purpose, consequently I could use it much thinner than I could alloyed gold.

60 X Q. The operation as you have described it is the operation as taught you by Dr. C. M. Richmond, is it?

A. Yes, sir.

61 X Q. Will you please look at "Exhibit Searles No. 2," from which the expert has removed the root, and state whether that does not show that you are mistaken in your testimony.

Question objected to as containing that which is not in proof.

Counsel for defendants states that he has never seen this exhibit since it has been altered, and has had no opportunity to cross-examine the expert as to the methods pursued in the removal of the root when the root was removed.

A. It does not; it does not show that I am mistaken in my testimony.

62 X Q. Will you state why you were in the habit of soldering the thin gold over the ends of the cap, as you have detailed?

A. I could state no other reason than I have already stated.

63 X Q. As I understand your testimony, you have not as yet stated any reason. Will you please state what your reason was?

A. I stated—if my memory serves me, I stated that I did
184 it on account of convenience; sake of convenience or simply
fancy. I have no other reason beyond that, other than as I mentioned in my beginning, on account of the difficulty in soldering. I perhaps used more platinum that gold, although I am changing at the present day without any particular reason beyond what I have stated.

64 X Q. How many soldering operations did you do in carrying out, in completing, the Searles operation?

A. Well, there are always three in making and completing; from the beginning to the completion of the operation there is always three solderings.

65 X Q. Please describe them.

A. The first, the soldering the band, uniting the ends of the bands after being fitted; second, the soldering of the thin cap over this band, which constitutes the floor; third, the union of the band, cap, post, backing, and porcelain as a whole.

66 X Q. Did you ever use any gold-foil in completing these operations?

A. Yes, sir.

67 X Q. When did you use such gold-foil and in what way?

WITNESS: If you hand me that exhibit I will show you.

Counsel hands the witness "Defendants' Exhibit Gaylord Model," as requested.

A. Sometimes in grinding the porcelain to fit the band or top of the cap there is not a perfect fit made; it would strike at the centre and sometimes not close here, or rather ground off too much at the back part of the porcelain. In that case I put a piece of foil of sufficient thickness between the top of this cap or floor and the porcelain. I have also used it in imperfect solderings between the post and the floor where the solder has failed to unite perfectly about that on the inside of the band so as to prevent the ingress of fluids there. There would be an opportunity in this—there is an imperfection. The object of that is to make a perfect joint, so as there should be no access of fluids in the cap.

68 X Q. In the first Searles operation did you pack in any foil?

A. I can't state. The operation was made so long since that my memory does not serve me.

69 X Q. May it have been, then, that instead of putting in a plate,
as you have said, you made that floor by putting in gold-foil
185 and then attempted to flow solder over it from beneath, so as
to close it?

A. What floor do you refer to? If you speak of the Exhibit No. 1 that I examined, what floor do you refer to?

70 X Q. Exhibit No. 1 has not been shown you to-day. I ask you in regard to the first Searles operation. In that operation may it have been true that after fitting the band you packed in some gold-foil and then attempted to flow solder over it so as to make what we have called the floor in the cap?

A. No, sir. My impression is, my belief is, that I made that as I have stated. If there was an imperfection, as I stated before, underneath the porcelain, between that and the floor, then undoubtedly it was filled with gold-foil, but the floor was placed upon that band and soldered there before the porcelain was fitted to it.

71 X Q. You state, then, positively that floor was not made by packing in gold-foil and subsequently soldering it, do you?

A. That is my belief, so far as my memory will serve me.

72 X Q. (Question repeated.)

A. I can't make a positive statement because my memory don't serve me in that particular case.

Redirect examination by Mr. BEACH:

73 R. D. Q. When you packed in this gold-foil in any instance was that packing done before or after the final soldering?

A. After. Now, you will have to designate which final soldering; what you call final soldering.

74 R. D. Q. I refer to the soldering which unites the porcelain and the pin and the band and cap into the completed tooth crown.

A. That gold-foil may be placed there after that soldering or it may be placed there before, where that imperfection exists. I usually see it before investing and place the foil there at that time, and, as I said before, that after soldering finally if there is still an imperfection in the floor in any point then that is filled in by packing gold-foil, if it can be done so to make a perfect joint, or it is put in the fire and resoldered.

75 R. D. Q. Now, in case the gold-foil is inserted into any defect apparent previous to this final soldering operation, state if you know what the effect of that final soldering is as to its fusing or not fusing the foil so introduced.

A. It might be possible by the union of the solder with this
186 gold foil, being thin—there might be sufficient heat there to
fuse that gold-foil. It is not intended to do that.

76 R. D. Q. You have stated in answer to cross-interrogatory as to the details of making the Searles operation, which you say were made in the same manner—a certain series of steps; was that process or method of manufacturing such tooth crowns your uniform practice or not?

A. It was.

77 R. D. Q. Is it your practice to-day?

A. It is.

78 R. D. Q. Will you please look at "Defendants' Exhibit Searles No. 1," which I now hand you, and from which the root also appears to have been removed, and say whether that operation of the metal floor which remains in that exhibit presents the appearance of having been packed in in the shape of gold-foil?

A. It does not.

79 R. D. Q. Do you observe upon that surface any marks or scratches which seem to have been formed by some hard instrument? Please examine the exhibit carefully before you answer.

A. I observe evidences of abuse on that, sir—a mutilation.

80 R. D. Q. A mutilation in what respect?

A. By scratching with some hard instrument there and picking away at the floor.

81 R. D. Q. Now, will you please look at "Defendants' Exhibit Searles No. 2," with a specific reference to that portion of the metal floor which is visible, and describe the condition thereof?

A. I find the floor partially removed inside of the band, but the edge of the floor underneath the edge of the band is still intact, showing that it was a platinum floor extending over the entire surface of the band.

82 R. D. Q. Please look at the inside of the band in that exhibit and see whether you perceive upon that band marks which may have been made by some hard instrument.

A. Both upon the band and upon the floor.

83 R. D. Q. Look at that portion of the inside of that exhibit which shows now a porcelain surface and say whether you perceive any traces of metal attached to that porcelain surface.

A. I do.

Signature waived.

187 DEFENDANTS' EXHIBIT DENTAL COSMOS, KROUSE, 1879.

Dr. J. N. Krouse, Chicago, commended the Richmond process of setting gold crowns, though at first he was inclined to disfavor the idea. Those who have used it most think most of it. He had had the pleasure a few days since of seeing a case where two crowns were inserted side by side by this process, one being attached to the root in the usual way and the other by its side, where there was no root, fastened to the first crown, thus making one root support two crowns.

DEFENDANTS' EXHIBIT MISSOURI DENTAL JOURNAL, MORRISON, MAY, 1869.

A New Operation.

Miss W. came to me with a first left lower molar decayed to the extent that the entire lingual and a greater part of the labial surfaces below the gum were removed. The roots were filled properly with gold, and the crown had been filled several times. The
188 last time the crown was built up in good style, but the two
walls being of such a shape that the filling could not be made self-retaining, I took a natural tooth corresponding as nearly as possible in size and shape to its fellow of the opposite side, and imbedded its roots in plaster to make a model from which to get a metallic die over which to swage a gold cap. I used a thin piece of pure gold plate, cutting it at the corners, giving but a slight lap for soldering after it was perfectly fitted to the die. I then fitted this cap accurately to the remaining portion of the tooth in the patient's mouth, allowing it to extend under the free margin of the gum quite to the alveolus, which was about the thirty-second part of an inch below the margin of decay. After soldering a bar across the cap from the lingual to the labial surfaces, it was finished and polished at the lathe. I then prepared the patient's mouth as usual for filling, made a thin paste of oxychloride of zinc, filled the cap, and pressed it to its place. The superfluous cement was crowded out of the cap and removed at the margin of the gum. I had the pleasure of seeing that tooth to-day, nearly four months after the operation, and had the gratification of seeing and hearing it pronounced a perfect success.

N.

189 UNITED STATES PATENT OFFICE.

JOHN B. BEERS, of San Francisco, Cal.

Improvement in Artificial Crowns for Teeth.

Specification forming part of Letters Patent No. 144,182, dated Nov. 4, 1873; application filed Sept. 27, 1873.

To all whom it may concern:

Be it known that I, John B. Beers, of San Francisco city and county, State of California, have invented improvements in restoring broken or decayed teeth, and I do hereby declare the following description and accompanying drawings are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use my said invention or improvement without further invention or experiment.

The usual methods employed by the dental profession for restoring decayed or broken teeth to their original size and shape is to build upon the base or exposed portions of the old teeth a new one by condensing gold with a hammer until it has assumed the desired size and form. This process of restoring teeth is at once costly, difficult, and tedious, and the continued hammering upon the jaw necessary to build up the tooth frequently causes periosteal inflammation. Besides this process, pivot teeth are sometimes employed, but they are very unsatisfactory.

190 The object of my invention is to provide a metal cap or crown socket, of the desired size and form, which can be slipped on over the projecting portion of the old tooth and which can be secured firmly to it, so as to serve all the purposes of mastication the same as an original tooth, while at the same time effectually preventing any further decay.

In order to explain my invention so that others will understand the same, reference is had to the accompanying drawing, forming a part of this specification, in which—

Figure 1 shows the cap applied upon a molar tooth. Fig. 2 shows the cap applied upon an incisor tooth. Fig. 3 shows the cap detached from the incisor tooth. Fig. 4 shows the cap detached from a molar tooth. Fig. 5 shows the cap and screw ready to be applied to one of a set of teeth.

A represents a cup-shaped socket or hollow shell, which I make out of gold, the exterior of which is in the form of a human tooth, the closed end being made similar to the crown or point of the tooth for which it is to be substituted. To apply this shell or crown I first clean away the decayed portions of the old tooth and remove the nerves from the roots, so as to leave nothing but a healthy and solid base for the crown. The old roots should then be filled with gold, so as to exclude moisture and prevent any further tendency to decay. I then select a crown or shell of the proper size to closely embrace the projecting neck of the old tooth and trim the edge of its open
191 end until it nicely fits the margin of the gums or a few lines
below it. When the articulation with the opposing tooth has been correctly obtained I secure in the old tooth a gold screw, *e*, or its equivalent, so that its head will project above the tooth, as represented at *f*. I then fill the crown or shell A with oxychloride of zinc or other suitable cement, and immediately replace it upon the projecting portion of the old tooth, where it will soon become firmly fixed by the hardening of the cement.

A small quantity of enamel can be first fused into the shell and the cement filled in afterward, so that when the gold crown or wearing edge of the gold shell wears through, a hard and permanent surface will still be preserved.

I thus provide an exceedingly useful improvement in dentistry by saving the time, annoyance, and danger attending the building-up process. At the same time I provide a tooth equally reliable for all purposes of mastication as the original tooth.

Having thus described my invention, what I claim and desire to secure by letters patent is—

1. The hollow metal crown or shell A, for the purpose above described.

2. The hollow metal crown or shell A, when filled with a porcelain enamel or other substance, substantially as and for the purpose above described.

3. A shell or hollow crown secured upon and around the
192 projecting portion or neck of a tooth by means of the screw
e and a suitable cement, substantially as above described.

In witness whereof I hereunto set my hand and seal.

JOHN B. BEERS. [L. S.]

Witnesses:
JOHN L. BOONE.
C. M. RICHARDSON.

DEFENDANTS' EXHIBIT DENTAL COSMOS, TALBOTT, SEPT., 1880.

Gold Crowns.

By Eugene S. Talbot, M. D., D. D. S., Chicago.

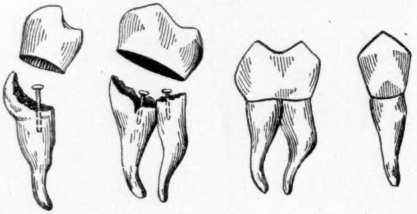
The adaptation of gold crowns to otherwise worthless roots of natural teeth in order to preserve their usefulness is one of the modern expedients which claims the careful consideration of every member of the dental profession. Only within a few years has it been thought desirable to do anything in this direction. The rule has been to sacrifice all such remnants in order to prepare the mouth for an artificial denture. The plan of treating roots by filing them off level with the gums and filling them, in order to preserve the natural
form of the arch, where an artificial denture on a base plate
193 is to be worn, has not met with general favor, the tendency
of the roots under such circumstances to a gradual protrusion
from the gum causing great trouble to both patient and operator. Moreover, it is not always desirable to insert an artificial denture containing one or two teeth, especially when they are required for only one side of the mouth. In supplying molars or bicuspids in such cases a full-sized plate is required, and in cases of difficult articulation the necessity of clasping the plate to the opposite side of the mouth is productive of a great amount of discomfort.

The credit for the suggestion of gold crowns is due to the late Dr. B. Beers, who settled in California in 1849. He received a patent for his invention in 1873. While in San Francisco, in the spring of this year, I had the opportunity of examining several crowns inserted by him, which had stood the test of more than seven years of service. Owing to the death of Dr. Beers, in 1874, but little has been *down* towards bringing this valuable invention to the notice of the profession. In explanation of the invention of Dr. Beers I copy the circular (with cuts) sent out by him to the profession in 1873:

"First. Do not undertake to fit a gold crown on an old root unless there is sufficient left of the broken or decayed tooth above the surface of the gum to allow a band of gold to encircle it.

"Second. Take an impression in wax of the broken tooth
194 requiring a crown and make an articulation. This will give
the exact size and form required. It will save both the patient
and operator much time.

"Third. Take a strip of flat gold and strike with the punch in the center of it, into a piece of lead. This will give the front form of an incisor, lateral, or bicuspid. Then anneal the gold and bend the two ends round the tooth requiring a crown. When properly fitted solder the ends together. Then adjust the bite by hollowing out with a half-round file, so that it articulates properly with its antagonist.



"Fourth. Then bend a piece of thick, flat gold with half-round pliers to suit the form of tooth required, and solder securely on the top of gold tooth and finish up.

"The above directions refer only to incisors, laterals, and bicuspids. For molars:

"First. Fit a stout gold band around the neck of tooth. See that it fits exactly. Then strike up in a piece of lead a gold crown, the size required, and run some gold solder into it to make it strong;
file it down; adjust and solder it neatly on the gold band
195 that fits the tooth. This will give the exact form of a molar
and make a perfect cap or crown for root.

"Second. In some cases it is not necessary to use gold screws with T heads, as the gold crown fits so closely and firmly to the root that the cement is found quite sufficient.

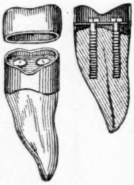
"Third. It is found desirable sometimes to lance the gum around the neck of the tooth to allow the crown to fit well and prevent inflammation.

"The cement found most suitable in fastening on these crowns is the German os-artificial."

In selecting roots for the application of gold crowns care should be exercised to select those only which are firm in the alveolar process or which can be made firm by treatment. The tissues being in a healthy condition and the root filled, any remaining portion of the crown and neck of the tooth should be trimmed with a corundum wheel or file into right-angular surfaces, as in Fig. A, so that the circumference of the crown shall not be larger than the circumference of the root over which the band is to fit. An impression should then be taken in plaster or wax, not only of the root of the tooth to which a crown is to be adapted, but also of the adjoining teeth, and the articulation taken as well, thus securing measurements of length and width and any deviation in the position of the natural teeth. The gold to be used should be 22 carat or coin gold, rolled to the thickness of No. 27, Stubs's gauge. The distance from the free margin of the gum to the edge of the alveolar process should then be ascertained and a 196 strip of gold cut in width a little less than the distance from the alveolar process to the grinding surface of the occluding tooth. It is not necessary to incur the expense of making a steel die, as suggested by Dr. Beers, but after annealing the gold band bend the end of it with round-nosed pliers, fitting it either to the root or to the plaster model. After accurately fitting the band saw off the surfaces, and with a file reduce the edges so that when brought together the diameter of the band shall be a trifle less than that of the root. The edges should then be united with 20-carat solder. The fit of the band may then be tested, either upon the natural root or upon the model. A piece of gold plate, filed to the shape of but a little larger than the diameter of the band, should now be soldered to the band. The cusps can be made for bicuspids or molars either from gold plate cut into the proper shape or by fusing gold into globules by the blow-pipe and subsequently flattening them with the hammer; these placed in position and soldered to the grinding surface. When polished the crown is ready for the mouth. For attaching the crown to the root I prefer Hill's stopping, red gutta-percha, or one of the non-irritant cements, instead of an oxychloride of zinc cement, as recommended by Dr. Beers, the latter having caused trouble occasionally by producing irritation of the gums and mucous membrane.

In the case of a root decayed either upon the side or in the center nearly to the alveolar process and yet firmly fixed in the jaw, or 197 in the case of a crown partially decayed, and on which, owing to its peculiar shape and position, it would be impossible to attach a gold crown in the manner described, I have practiced the following method with success: Preparing the root precisely as in the preceding case, I cut the remaining part of the crown down to one-half its length; trim the rough edges; separate the gum down to the alveolar process; adjust the band as before; remove and solder; get the distance from the alveolar process to the external end of the root, and file a piece of gold plate to fit inside of the band. After finding the position and direction of the pulp canals, I punch holes in the plate to correspond therewith, adjusting the plate inside of the band, so that the distance from the plate to the edge of the band will be a little less than from the end of the root to the alveolar process. (Fig. B.) I then solder the plate in position and enlarge the holes so as to admit the screws to be used. I then place the band over the root and pass drills through the holes in the plate to enlarge the canals and make them the length required by the screws; then remove the band and place wires of the same

Fig. B.



size as the screws into the holes in the plate; then place in
198 a sufficient quantity of red gutta-percha (warmed) to fill the
space between the root and the plate; insert the ends of the wires into the canals and force the band into position. When the filling has hardened remove the wires and secure screws in their places. A crown attached in this manner will resist the greatest strain required of it.

In completing such operations the practitioner has a choice of three methods and must be governed by circumstances in deciding which to employ. A filling may be inserted in the ordinary manner; a gold crown may be slipped outside of the band, or, where the adjoining teeth are very near together, a crown can be made to slip inside of the band, in either case cemented with red gutta-percha or Hill's stopping. If the operation has been skillfully performed, the union will be firm and lasting.

Looking at it from a physiological standpoint, we see the following reasons why such operations are desirable: After the death of the pulp the source from which the dentine and enamel receive their nourishment is cut off, but the cementum, receiving its pabulum from the pericementum, may and frequently does live many years after other portions of the tooth have lost their vitality. If the crown be perfectly fitted and securely attached, it makes a better operation than are the majority of contour restorations. The exposed part of the root, being entirely protected from the fluids of the mouth, is not liable to caries.

The advantage of this method of restoring the crown of a
199 tooth is thoroughly appreciated by those who have undergone
the tedious operation of restorative fillings. The only discomfort occasioned to the patient by this method is a slight inflammation, which generally follows the forcing of the band into place.

UNITED STATES PATENT OFFICE.

HENRY W. F. BUTTNER, of New York, N. Y.

Artificial Tooth.

Specification forming part of Letters Patent No. 245,782, dated Aug. 16, 1881; application filed Feb. 3, 1881. (No model.)

To all whom it may concern:

Be it known that I, Henry W. F. Buttner, of the city, county, and State of New York, have invented a new and improved artificial tooth crown and process of setting the same, of which the following is a full, clear, and exact description.

There are various methods of pivoting the natural roots of human teeth, but they fail or are defective in the matters of strength and firmness and in preventing the decay of the root.

The object of this invention is to overcome these objections.

200 The invention consists in turning down the upper end of the tooth root, so as to form a circular shoulder thereon, the irregular upper surface of tooth being cut off in a horizontal plane to accurately fit the metallic cap which carries the artificial crown; and it further consists of a metallic cap composed of a ring circular plate and central pivot, the ring fitting upon the shoulder of the root, the pivot fitting upon the shoulder of the root, the pivot tightly fitting into the central hole made in the root, and the plate fitting closely and air tight upon the plane upper surface of the root and uniting the ring and pivot; and the process consists of enlarging the nerve canal of the tooth root with a suitable tool, in then cutting off the upper surface of the root on a perfect level, and in then cutting away the walls of the root to form a circular shoulder thereon. A cap is then prepared to fit the root, and has an artificial crown suitably attached to it, and is then fitted upon the top of the said root and forced down thereon, so that the pivot shall enter the central hole, the ring encircle the shoulder and the plate fit closely on the plane top.

Figure 1 is a vertical sectional elevation showing my improved tooth crown applied to a tooth root. Fig. 2 is a vertical sectional elevation of a tooth root prepared according to my improved method. Fig. 3 is a sectional elevation of my improved tooth crown. Fig. 4 represents an elevation and a plan of the reverse of an improved tool for cutting of the surface of the root. Fig. 5 represents 201 an elevation, with parts broken away to exhibit other parts, and a plan of the reverse of an improved tool for forming the shoulder on the tooth root. Fig. 6 represents an elevation, with parts broken away to exhibit other parts, and a plan of the reverse of an improved tool for simultaneously cutting of the top and forming the shoulder on the tooth root. Fig. 7 is a perspective view of the cap connecting the crown with the root.

Similar letters of reference indicate corresponding parts.

In the drawings, A represents the root of a tooth having its nerve channel bored out, as shown at *a*, by a suitable drill, its upper sur-

Fig. 1.

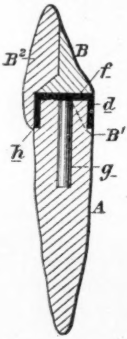
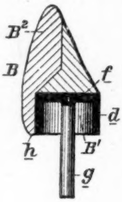


Fig. 3.



face cut off on a level plane, as shown at *b*, preferably by a tool represented in Fig. 4, the *the* spindle of said tool being inserted into the bore *a* of the tooth root A to steady the said tool in its work, and the upper end of the root A has its walls cut away, preferably by a trephining tool represented in Fig. 5, whereby a circu-
202 lar shoulder, *c*, is formed, the lower end of the said tool spindle being inserted in the bore *a* of the tooth root for convenience of working said tool. It will be seen that in cutting or forming this plane *b* and shoulder *c* I change the irregular shape of the end of the tooth root A to a regular shape, so that the artificial crown B can be fitted securely and air tight upon said root A, thereby protecting said root from decay, and the surounding tissues from inflammation, by leaving no space between the crown B and root A for the deposition of organic matters, and thereby making it easy, also, to secure the artificial crown B more firmly than can be done when the tooth root A is left with its natural irregular surfaces.

The crown B consists of the cap B′ and artificial tooth B². The cap B′ is formed of a metallic ring, *d*, within which is secured a circular horizontal plate, *f*, from the center of which a pivot or spindle, *g*, projects downward.

The tooth B² is one of the ordinary kind, cut away on its under face, as indicated at *h*, to fit over and upon the periphery of the ring *d*, and hide it from view on that front, said tooth B² being then united in the ordinary manner with solder to the cap B′. The said crown B is fixed upon the root A by inserting the spindle or pivot *g* into the bore *a*, and by then driving said crown B down into place by repeated blows of a mallet.

Though I prefer the method herein set forth for uniting an artificial tooth crown to a tooth root, I do not confine myself to
203 it, as I find it possible to put artificial crowns on roots without destroying the root nerve, in which case I do not bore the tooth root nor provide the tooth cap with a pivot or spindle, but make a cap consisting only of the ring *d* and horizontal plate *f*,

which cap, when fitted closely on the tooth root, holds the crown very securely on the said root.

I am aware that processes somewhat resembling mine have been practiced, but in none of them is the tooth root first prepared with smooth and regular surfaces, but, on the contrary, the natural outline of the root is preserved, so that it is difficult, if not impossible, to fit an artificial crown onto the said root so closely that organic matter cannot lodge in the joint and cause decay and inflammation, nor in such processes can the crown be so invariably secured with proper firmness and strength as by the improved process herein set forth.

In lieu of the tools shown in Figs. 4 and 5, I sometimes use, in preparing the tooth root, an improved tool combining the advantages of both, said tool serving to form the plane on the upper surface of the root, and at the same time to form the circular shoulder for the ring to fit upon, as shown in Fig. 6.

I am aware that artificial teeth crowns have been connected with the natural tooth or root by a screw which passes through the said crown into the metallic base of the root; but what I claim as new and of my invention is—.

204 1. The improved process, substantially as herein described, of setting artificial tooth crowns, which consists in forming a horizontal plane and circular shoulder on top of the root, and fitting the crown thereto by means of a horizontal plate and its inclosing ring, to which the crown is connected, said plate being fitted closely on the horizontal plane, and the ring about the circular shoulder formed on said tooth root, as set forth.

2. The combination, with the tooth root A, having a horizontal surface plane, *b*, and annular shoulder *c*, of the cap B′, composed of ring *d*, plate *f*, and spindle *g*, substantially as herein shown and described.

HENRY W. F. BUTTNER.

Witnesses:
J. J. STORER.
C. SEDGWICK.

I, Edwin E. Marvin, clerk of the United States circuit court for the district of Connecticut, do certify that the foregoing return is a true and correct transcript of the process, pleadings, proofs, and record recorded and on file in this court in the case of The International Tooth Crown Company against Edward S. Gaylord and John L. Williams, No. 491, in equity.

Seal of Circuit Court, Connecticut.

In testimony whereof I have hereto set my hand and the seal of said court, at Hartford, in said district, this 4th day of November, A. D. 1887.

E. E. MARVIN, *Clerk.*

Endorsed on cover: Connecticut C. C. U. S. No. 294. The International Tooth Crown Company, appellant, *vs.* Edward S. Gaylord & John S. Williams. Filed November 8th, 1887.

SUPREME COURT OF THE UNITED STATES.

October Term.

The International Tooth Crown Company } No. 294.
vs.
Edward S. Gaylord and John S. Williams.

It is hereby stipulated between counsel for the respective parties to the above-entitled suit that the record herein be amended by adding thereto a copy of the final decree entered in this case in the circuit court of the United States for the district of Connecticut, and also by adding a copy of the opinion of the court, said copies to be forwarded to the clerk of the Supreme Court of the United States by the clerk of the U. S. circuit court for the district of Connecticut.

And further stipulated that said record be amended by adding a Patent Office copy of the drawings of letters patent No. 144,182, to John B. Beers, dated November 4th, 1873.

E. N. DICKERSON,
Solicitor for Appellant.
JOHN K. BEACH,
Counsel for Def't and Appellees,
By FRANCIS G. BEACH.

United States of America, } *ss:*
District of Connecticut,

Seal of Circuit Court,
Connecticut.

I, Edwin E. Marvin, clerk of the circuit court of the United States for the district of Connecticut, do certify that the annexed paper is a true copy of the original final decree in the matter of—

International Tooth Crown Company } No. 491. In Equity.
vs.
Edward S. Gaylord and J. L. Williams.

on file in said court.

In testimony whereof I have set hereto my name officially and the seal of said court, at Hartford, in the said district, this 26th day of February, A. D. 1891.

E. E. MARVIN, *Clerk.*

At a stated term of the circuit court of the United States in and for the district of Connecticut, held at the city of Hartford, on the 22d day of September, 1887.

Present: The Honorable Nathaniel Shipman, district judge.

THE INTERNATIONAL TOOTH CROWN COMPANY
vs.
EDWARD S. GAYLORD and J. L. WILLIAMS.
} In Equity.

This cause came on to be heard at the April term, 1886, of this court, and was argued by counsel for the respective parties, and thereupon and upon consideration thereof it is found and hereby ordered, adjudged, and decreed that the bill of complaint herein be dismissed without costs.

N. SHIPMAN,
District Judge.

We hereby consent to the entry of the foregoing decree without prejudice to complainant's right of appeal.

DICKERSON & DICKERSON,
Sol'rs for Compl't.
JOHN K. BEACH, *Sol. for Def'ts.*

[Endorsed:] No. 491. U. S. circuit court, district of Conn. The International Tooth Crown Company *vs.* Edward S. Gaylord & J. L. Williams. Final decree. Filed Sept. 22d, 1887. E. E. Marvin, clerk. Copy.

UNITED STATES OF AMERICA,
District of Connecticut,
} *ss:*

Seal of Circuit Court,
Connecticut.

I, Edwin E. Marvin, clerk of the circuit court of the United States for the district of Connecticut, do certify that the annexed paper is a true copy of the transcript of opinion upon which the final decree was based & which is on file in this court in the matter of—

THE INTERNATIONAL TOOTH CROWN COMPANY
versus
EDWARD S. GAYLORD & J. L. WILLIAMS.
} No. 491. In Equity.

the said case having been tried on the same pleadings and proofs with the case of the same plaintiff *versus* Cassius M. Richmond *et al.*, in the southern district of New York, by consent of parties, & the original opinion of J. J. Wallace & Shipman, who heard the cases, being filed in the latter district.

In testimony whereof I have set hereto my name officially and the seal of said court, at Hartford, in said district, this 11th day of March, A. D. 1891.

E. E. MARVIN, *Clerk.*

Circuit Court, District of Connecticut, Feb. 21, 1887.

INTERNATIONAL TOOTH CROWN CO.
vs.
RICHMOND and Others.

WALLACE, *J.:*

The complainant is the owner of four patents relating to improvements in the dental art, all of which are alleged to be infringed by the defendants. This suit is brought for an injunction and accounting. The first of the patents is suit was granted to James E. Low March 15, 1881, upon an application filed December 20, 1880. The subject is an improvement in dentistry whereby artificial dental surfaces may be permanently fixed in the mouth in place of lost teeth without the use of plates or other means of deriving support from the gum beneath the artificial dentition. The patentee refers in his specification to the pre-existing state of the art as follows:

"Heretofore artificial teeth have invariably been supported entirely by the gum and usually upon a plate fitted to the gum, and, in the case of upper teeth, to the roof of the mouth. Clasps or attachments to the adjacent teeth have been employed for the lower jaw to retain the artificial teeth in proper relation to the adjacent teeth, but said attachments have never been designed or adapted to sustain the pressure upon the artificial teeth in mastication without aid from the gum. The use of plates or other methods of supporting the artificial teeth by the gum is highly objectionable, because, first, they necessarily cover the cutaneous surfaces, which health requires should be uncovered; second, they occupy a space within the mouth, and are uncomfortable; third, they require frequent removal for the purpose of being cleansed; fourth, they accumulate offensive matter next the skin, and therefore promote disease. The use of clasps to retain the teeth, with very small supporting plates, has very generally been abandoned for the upper jaw, because the injury to the teeth by the clasp is supposed to be more objectionable than the discomfort and other disadvantages attending the use of the suction plate."

He points out the general advantages of his invention as follows:

"All the objections to the presence of artificial dentition mentioned above are obviated by my improvement, which leaves the cutaneous surfaces uncovered and supports the artificial dentition by its attachment to the adjacent natural teeth, and the same method of attachment is equally applicable to both the upper and lower jaw."

The general description of his improved method is as follows:

"A band of gold or other suitable metal is first prepared and accurately fitted around the tooth adjacent to the vacant spaces to be supplied with an artificial tooth. This band is firmly secured in place by cement, which effectually excludes water or the fluids of the mouth, and is thus permanently attached to the tooth, so that it cannot be removed without an operation directly for that purpose. It is sometimes sufficient to prepare one of the adjacent teeth in this way, but generally it is desirable to prepare the adjacent teeth on each side of the vacant space. It will always be advisable to do so if the vacant place is to be occupied with more than one tooth. The artificial block to fill this vacant place may comprise one or more teeth, as the case may require, and, if desired, may be moulded in a single block. The lower surface adjacent to the gum is cut away at the back, and only descends to contact with the gum along its front edge, so as to prevent the appearance of an open space between the artificial teeth and the gum. The artificial block is provided with protecting lugs or pins of suitable metal, and may thereby permanently be secured by screws or otherwise to the permanently fixed bands around the adjacent fixed natural teeth. The small area covered by the bases of the artificial teeth and its non-contact with or pressure upon the gum renders the deposition of secreted or foreign matter from the food unlikely and easily removable with the brush or by water forced under the artificial teeth in the process of rinsing the mouth. It sometimes happens that a tooth has elongated to such an extent that there is not space between its crown and the opposite gum for the insertion of a regular tooth, and in such a case as that I sometimes supply an artificial dental surface, composed of one or more metallic bars, extending from one permanent tooth to the next, and secured at their end to the band."

The specification states that the patentee does not propose to limit himself to the details as shown in his specification and drawings, but considers that his invention includes "the permanent attachment of artificial teeth by securing them to continuous bands permanently attached to adjoining teeth supported upon natural roots, and supporting said artificial teeth by said attachments without dependence upon the gum beneath said artificial tooth."

The claims of the patent are as follows:

"(1.) The herein-described method of inserting and supporting artificial teeth, which consists in attaching said artificial teeth to continuous bands fitted and cemented to the adjoining permanent tooth, whereby said artificial teeth are supported by said permanent teeth without dependence upon the gum beneath.

(2.) An artificial tooth cut away at the back so as not to present any contact with the gum except along its front lower edge, and supported by rigid attachment to one or more adjoining permanent teeth, substantially as and for the purpose set forth."

It is entirely clear that the invention described in the patent was not only new and useful, but was an improvement in the dental art of considerable merit. The former methods of supporting artificial teeth referred to in the patent were not designed to secure a permanent attachment of the artificial teeth to the natural teeth, but were intended to secure a removable attachment, the theory of many dentists being that a rigid attachment was undesirable and impracticable, as uncleanly, and also as liable to produce inflammation of the natural teeth. The methods which had been employed to secure a permanent or rigid attachment of the artificial to the natural teeth were well calculated to ex-cite the distrust and opposition of intelligent dentists. One of these is described in an article of which W. H. H. Eliot was the author, published in March, 1844, in the American Journal of Dental Science. This describes an artificial denture consisting of three teeth fastened upon a backing of metal. The extreme teeth, or the ones at each end of the artificial denture, are provided each with a pin. These pins are to go into holes drilled in the prepared roots of natural teeth, and in this way the denture is to be held in place. A slight bearing surface is formed by plates which are to bear upon the smooth ends of the natural roots remaining in the gum. This denture simply consists of teeth held in by pivots and connected by a bar or backing of metal. Another of these methods is described in the United States patent to Benjamin J. Bing, of January 23, 1871. This method consists in attaching artificial teeth to metallic bars, which bars at either end are to be secured to natural teeth by forming cavities in the natural teeth, inserting the ends of the bars in the cavities, and then filling the cavities with gold.

The objection to the use of plates or other methods of supporting the artificial teeth by the gum are sufficiently pointed out in the patent, and the objections to methods like those of Eliot and Bing for supporting the artificial teeth by a permanent attachment to natural teeth or the roots of such teeth are obvious.

Where pivots are inserted in the teeth to secure a rigid attachment, as in the Eliot method, they become loosened in the process of mastication and the teeth are liable to be split by sidewise wrench or motion. Such methods as Bing's tends to the destruction of the adjacent natural teeth, the strain and motion in mastication loosening the metal fillings and requiring a reattachment of the denture from time to time, to the increasing injury of the natural teeth.

By the method of the patent a plate is dispensed with when some natural teeth remain, and instead of the artificial teeth being loosely clasped to the adjacent natural teeth they are attached with strength and permanency, and are forced into contact with the gum during the strain of mastication. By being firmly fixed upon bands of metal secured rigidly and permanently, by cement or otherwise, upon the adjacent natural teeth which they surround, the denture has an easy and efficient bearing, the gum escapes injury, and the strain of mastication is transferred to the natural teeth. When the artificial teeth employed have their surface adjacent to the gum cut away at the back and only descend to contact with the gum along the front edge, another advantage results, because the small area covered by the bases of the teeth precludes such an accumulation of food or other foreign matter between the gum and the denture as cannot be readily removed. It is not contested that Low was the first to devise and perfect the improvement described in the patent, but it is urged that, in view of the prior state of the art, as described by the publications referred to and as also described by the publications of Lintott, Scott, Fowell, and others, the improvement of Low did not involve invention. The references to the publications of Lintott, Scott, and Fowell are not of sufficient importance to require comment. Undoubtedly Low was materially assisted in perfecting his invention by his observations of the artificial crown of Dr. Richmond, and it is not unlikely that the invention derives its chief value from its adaptability to use with the Richmond crown. It may not have involved a high order of inventive faculty to work out the conception by connecting such crowns by a bar or bridge bearing an artificial tooth or teeth; nevertheless the fact remains that Dr. Low was the first to accomplish successfully what skillful dentists like Dr. Rich did not believe to be practicable, and to demonstrate how the objections which were supposed to be so serious to the method of rigid attachment could be obviated. It is not difficult after the fact to show by argument how simple the achievement was and, by aggregating all the failures of others, to point out the plain and easy road to success. This is the wisdom after the event that often confutes invention and levels it to the plane of mere mechanical skill. The ingenious argument in this case has not satisfied us that there was no invention in the improvement of Low.

The defense is relied on that the invention had been in public use for more than two years before the application for the patent. The proofs show that operations were performed by Low during the latter part of the year 1877, in which he inserted the dentures of the patent in the mouths of patients. As the application upon which the patent was granted was not filed until December 20, 1880, the defense would be established were it not for the fact that Low had made an application which was filed in the Patent Office January 6, 1879, which had never been abandoned, for substantially the same invention. That application contained some matters foreign to the subject of the second application, but, so far as it related to the inventions covered by the claims of the patent, it did not differ from the second application, except in a single particular. The specifications of the patent states that non-contact of the artificial tooth or denture carried by the bridge with the gum or the absence of pressure upon the gum is one of the advantages of the invention, while it was stated in the first application to be necessary "to carefully fit the base of the tooth or block to be inserted to the jaw, and when secured it should be so pressed down as to leave no space beneath it for the admission of food." The statement in the first application is not inconsistent with the method of the patent, which consists in attaching the artificial tooth or the denture to bands and supporting them by the adjoining permanent teeth "without dependence upon the gum beneath." So long as this essential feature of the invention is retained it is quite immaterial whether the artificial dentition "is so pressed down as to leave no space beneath it for the admission of food," in the language of the specification, or whether it is in positive non-contact with the gum. When the artificial denture is in non-contact with the gum cleanliness is facilitated, and the suggestion which was first made in the second application was therefore a useful one, but it did not change the invention in essentials. Although the tooth or denture is pressed down so close to the jaw that food cannot lodge between it and the gum, it is still supported by the adjoining tooth or teeth, and not by the gum. As was stated in the first application, "the yielding surface on which it rests will readily conform to the tooth or block, and any pain at first induced by the pressure will disappear."

There is nothing to indicate that Low intended to abandon his first application. His application was refused, correspondence ensued with the Patent Office, and finally Low made a personal visit to the office, had an interview with the examiner, and convinced the examiner that the invention which was the subject of the application was meritorious and novel and one for which he was entitled to a patent. During the controversy with the Patent Office various interpolations had been made in the first application and the examiner suggested that Low had better make a new application, and thereupon the second application was drawn up. So far as relates to the present invention, the new application differed from the first merely in omitting some superfluous matters and in changing the description in reference to the character of the contact between the denture and the gum. There was no act on the part of Low which was equivalent to a withdrawal of his first application or to an acquiescence in its rejection. He merely made a new application as a more convenient way of presenting the original application for the final action of the office after he had been assured that the rejection of his first application would be reconsidered and a patent would be granted for the present invention. Both applications are to be considered as parts of one continuous proceeding, and the two years within which the invention could not be publicly used without invalidating the patent did not begin to run until January 9, 1879. Godfrey *v.* Eames, 1 Wall., 317; Smith *v.* Goodyear, etc., Co., 93 U. S., 500; Graham *v.* Geneva Lake, etc., Co., 11 Fed. Rep., 138.

The second claim includes, with the elements of the first class, the features of a tooth cut away at the back. Thus construed, the defendants infringe both claims of this patent.

The next patent in suit which may be most conveniently considered is No. 277,941, granted May 22, 1883, to Cassius M. Richmond, assignor, etc. The application for this patent was filed December 1, 1882. This patent is for the invention known in the dental profession as the "Richmond tooth crown." A patent was granted to Richmond, dated February 10, 1880, for an artificial tooth crown, and the present invention is said to be for an improvement upon the tooth crown therein described; but it is, in fact, for a radi-ally different tooth crown. The invention relates to an improved method or device for attaching such crown to the roots or stumps of natural teeth remaining in the mouth, the object being to provide an artificial crown of improved construction, to be adjusted and secured to the root of the natural tooth in a permanent, practical, and artistic manner, so that the tooth, when finished, will present a natural appearance and be capable of the same service as a sound, natural tooth. After the natural root or stump has been cut off or ground, preferably on a level with the gum, and a hole is drilled therein into which a pin is to be subsequently inserted, a metallic ferrule is then fitted upon and shaped to the prepared root of the tooth. A suitable crown is then selected to be applied to the root, color, size, and shape being consulted in order to make it conform in appearance to and as a substitute for a natural tooth. The artificial crown is provided with a metallic back or attachment, which has holes through it to allow the passage of the pins, which are firmly imbedded into porcelain. The root and crown having been so prepared, the crown is placed in position and attached to the ferrule by wax sufficiently to hold the crown firmly in position to allow of the removal of the ferrule. Then a suitable pin, designed to be inserted in the hole drilled in the root, is embedded in the wax. The prepared crown is then invested or protected by a suitable cover of marble dust and plaster, leaving the wax portion exposed. This investiture will hold the parts in the position which they are to occupy when placed in the mouth. The wax is then melted from the pin and crown and replaced by a suitable gold solder, which may be blown in a blow-pipe and fused around the pin. This solder will unite with the pin extending into the root, the ferrule, the pin extending into the porcelain, and the porcelain backing, making a solid metal backing to the crown, and firmly holding all the parts together. The prepared crown is then slipped upon the prepared root and cemented thereon, the ferrule when placed in position projecting along the very margin of the gum sufficiently to protect the root from decay and to conceal the ferrule from view. The specification contains the following statement:

"It will be seen that when this denture is applied to a root the end of the root is entirely protected from the injurious action of the fluids of the mouth and is hermetically sealed, being covered by a closed cap. This inclosing cap is of the greatest importance, because otherwise decay must necessarily take place by reason of the action of the fluids in the mouth on the exposed dentine, and the denture would become useless. By this arrangement, therefore, both the end of the root and so much of the same as might otherwise be exposed to the fluids of the mouth are hermetically sealed, and the root is thus protected from the injurious effect which would otherwise result from the action of the fluids. It is obvious that this part of my invention, namely, the sealing cap on the end of the root, may be used with other kinds of dentures and other arrangements of artificial crowns besides those shown herein, and that, when properly applied, the root is completely protected. As shown in figures 2, 4, and 7, the flange of the cap should project beneath the gum and allow the gum to extend to the porcelain crown. The freedom of the gum from permanent attachment with the end of the root allows this band to be placed in position without causing irritation. I do not limit myself to the precise method of attaching this inclosing cap to the root, as other methods might be employed, but the one here shown is the simplest known to me. The caps hereinbefore described are so constructed, as set forth, as to cover and inclose the prepared end of the root, wholly excluding the juices of the mouth therefrom and preventing the decay that would otherwise result."

The claims of the patent are as follows:

"(1.) The combination of a prepared root, having its natural terminal contour near the margin of the gum, with an inclosing cap attached thereto for supporting an artificial denture, substantially as described. (2.) The combination of a prepared root, having its natural terminal contour near the margin of the gum, with an inclosing cap attached thereto and with an artificial porcelain or other crown supported by said cap, substantially as described. (3.) The combination of a prepared root, having its natural terminal contour near the margin of the gum, with an inclosing cap attached thereto, the said cap being attached to the root by a pin or suitable attaching contrivance passing upward and into a suitable cavity in the root, substantially as described. (4.) The combination of a tooth crown, a metallic backing soldered to said crown, and a pin firmly soldered to said artificial backing and secured to and passing through a ferrule adapted to surround the root, substantially as described. (5.) The combination of the crown C, provided with suitable attaching pins E, the backing plate D, and the metallic backing N, united to ferrule B and pin Z, substantially as described. (6.) The combination of the crown C, metallic backing N, united to protecting plate D and pin Z, the root A and cement J uniting the pin Z to the root, substantially as described."

It is not open to doubt that this patent describes an invention in dentistry of the greatest utility and value. The invention enables an artificial tooth to be placed upon a natural root, which can only be distinguished from the natural tooth by the most critical examination, which is as serviceable while it lasts as a natural tooth, and which is very durable. The Richmond crown not only supplies the place of a natural tooth for the purposes of use so as to be a perfect substitute for a lost tooth, but it can be so artistically made as in many instances to be an improvement in appearance upon the natural tooth. Nevertheless, if the patent can be sustained as valid to any extent it can only be upheld by placing a very narrow limitation upon the claims.

Without referring at present to the prior state of the art at the time Dr. Richmond conceived the inventions of the patent in 1880 and of the present patent, it suffices to say that everything which is the subject of the fourth, fifth, and sixth claims of the present patent had been in prior public use for more than two years prior to the application for the patent and was public property prior to the year 1880, and if the remaining claims are valid it is only because an inclosing cap, by which the end of the root is hermetically sealed and thus protected from the action of the fluids of the mouth, is an element of each claim. The inventor himself had abandoned all the rest of his invention to the public. As early as in December, 1876, Dr. Richmond had inserted a denture in the mouth of a patient in San Francisco involving the principle of the patent. That denture differed from the artificial tooth crown of the patent only because the inclosing ferrule or band was not a cap which covered the end of the root, and did not extend so far under the gum of the patient as to wholly conceal the gold surface. The denture, as then inserted by him, was a complete practical success, and, so far as is known, still remains in use in the mouth of the patient. In the years 1878 and 1879 Dr. Richmond practiced the invention extensively in many of the large cities of the United States, and demonstrated to hundreds of dentists in public clinics and private practice the method of preparing and inserting his artificial tooth crowns. The method was practiced with differences of detail, but was always the same in essentials. The root was always prepared in the way pointed out in the patent, and the denture always consisted of a ferrule or band accurately fitted to surround the root, to which was soldered a crown with a porcelain front, having a pin extending into the root, the whole being cemented on the root in one piece. Sometimes a loose floor of platinum or gold was packed inside the band, behind the backing of the porcelain front, so as to make a floor above the solder when the crown was invested in position, and the solder blown in; and sometimes, instead of a loose floor, a half floor was joined to the band, extending partly over the end of the root, forming a cap embracing part of the exposed end of the root, and the solder was then blown in under this cap. When made in either of these ways the denture consisted of a porcelain tooth attached to a ring of gold at its upper part, and where the porcelain itself met the ring there was no solid floor to the ring, but the porcelain itself impinged upon the ring.

Among those to whom Dr. Richmond taught the invention was Dr. Gaylord, a dentist, one of the defendants in this cause. Two original dentures made by Dr. Gaylord and inserted in the mouths of patients—one in April, 1879, and other in May, 1879—have been produced in evidence and identified, and the fact that these tooth crowns were made and inserted at those dates and were practical and successful operations, and that with a single exception both were in all respects the tooth crowns of the patent, inserted according to the method of the patent, is clearly established. It is conceded by the expert for the complainant that if these dentures had been made with a ring or ferrule having a complete floor embracing the exposed end of the root they would be the tooth crowns of the patent. One of them has a half floor of platinum back of the porcelain under the ring, intended to partially inclose the exposed end of the root, and the other has a partial floor made of loose gold foil stuffed behind the porcelain before the solder was flowed through the back of the crown. It is insisted that when the crown is constructed in this way it does not have the inclosing cap of the patent, and consequently the end of the root is not hermetically sealed.

The controversy as to this patent is thus narrowed to the question whether the substitution of a complete floor over the end of the ferrule, so as to wholly inclose the end of the natural root, in the place of a partial floor involves sufficient invention to sustain the patent.

It is to be observed that in one sense the end of the root is hermetically sealed, according to the method of the patent, whether covered with the closed cap or not. The specification states that the prepared crown is slipped upon the prepared root and cemented thereto. As the invention was practices by Dr. Richmond from 1876, enough cement was placed inside the recess of the prepared crown to exude at the margin of the gum when the crown was forced on the root to fill up the space and to make a solid contact when hard between the root at all the parts exposed and the crown beneath and the ring surrounding the root. The cement not only serves to hold the crown firmly in its place upon the root, but forms a hermetically sealed inclosure of the root.

But it is insisted by the experts for the complainant and by some of the witnesses who have applied the invention practically that unless the ring has a solid metallic floor the porcelain where it joins the ring cannot be so closely united that the juices of the mouth will not enter at the joint; that the solder flowed in behind the porcelain will not effectually close this joint, and that in consequence the cement inclosing the root will be soon dissolved and destroyed by the secretions of the mouth. It is alleged that if the minutest hole or perforation is left in the floor of the inclosing cap the cement is exposed to the secretions; that the secretions of different mouths vary wonderfully in their destructive action, and that while in some cases the cement might resist for years, in others it would fail speedily, and thus that the practical value of the invention depends most materially upon the inclosing cap.

Inasmuch as Dr. Richmond had for years been practicing the invention without a closed cap and introducing his artificial crown everywhere to the profession as a perfect substitute, when inserted upon a natural root, for the natural tooth, it may be doubted whether the mechanical change of covering the ring with a solid floor, thereby converting it into a cap, was introduced by him so much for its utility as it was for the purpose of suggesting novelty and enabling him and those with whom he had become engaged to obtain a patent. The change was not made until others had become pecuniarily interested with Dr. Richmond in his inventions. Then it was suggested that the reason of the failure of several crowns which had been inserted for patients was that they were defective because they were open at the end of the cap inclosing the end of the root at the point where the porcelain came in contact with the cap. Thereupon the closed cap was adopted. No experiments were apparently necessary, but the defect was remedied as soon as it was suggested. It is testified that the effect of this change was greatly to increase the strength of the artificial crown and assist in protecting the root from the leverage of the pin by lateral pressure, as well also as to protect more efficiently the cement from the action of the secretions of the mouth. On the other hand, the testimony indicates that since the closed cap has been adopted it is not exclusively used by those who are authorized to practice the invention under the patentees, and although it is perhaps generally preferred, the impression left by the proofs is that there is considerable exaggeration in the opinion that attributes to the closed cap the peculiar efficacy which has been assigned to it.

If Dr. Richmond had been the first to make a closed cap for a use cognate to that to which it was applied by him, the question whether there was any invention in making the change might be resolved in favor of the complainant; but it was not new in the art to use a closed cap in order to hermetically inclose the root of a tooth. This sufficiently appears by reference to a publication in the Missouri Dental Journal, in 1869, of the operation of Dr. Morrison. That publication describes an operation in which a gold cap is fitted upon the root of a lost or decayed tooth, so as to be adjusted accurately to the remaining portions of the tooth and made to correspond in configuration with the original tooth. The cap is filled with a thin paste of cement and pressed to its place upon the root, the superfluous cement being crowded out at the margin of the gum where the cap extends quite to the alveolus. Another instance of the use of caps having a tight metal floor to be inserted on the natural roots of teeth and having a porcelain tooth crown soldered on the cap is disclosed in the patent granted February 3, 1881, to John B. Beers, for an improvement in artificial crowns for teeth. In view of those references alone it must be held that there was no invention in making the change which was effected by Dr. Richmond in the fall of 1881 by substituting the closed cap in the place of the cap with a partial floor or without a solid floor. All that Richmond did was to close the band or ferrule with a bottom of gold and build up his artifical crown upon it, and the way to do this had been already pointed out.

The patent cannot be sustained upon the theory that Dr. Richmond was experimenting with and improving his method of making and inserting artificial tooth crowns during the time intervening between his operation in San Francisco, in 1876, until at last, with the change to the closed cap made by him in the fall of 1881, he succeeded in perfecting an invention which up to that time had been inchoate or incomplete. During all this period he had been demonstrating and practicing the invention in public to dentists throughout the United States and in his private practice, with all the variations of mechanical detail. Those to whom he taught his method, for compensation, bought their instruction in order to practice the invention in their profession. They did practice it and it was put into successful use in all parts of the country, and it is now too late to deprive the public of what became rightfully theirs by supplementing to the invention a mere matter of mechanical improvement, which in itself had no patentable novelty.

The third patent in suit is No. 277,933, granted May 22, 1883, to Alvan S. Richmond, assignor, etc., for an artificial denture. It is sufficient to say of this patent that, in view of the inventions of Dr. C. M. Richmond and Dr. Low, the first and third claims embrace nothing which involves invention, and that carrying the metal of the bridge under the wearing surface of the porcelain does not impart patentable character to the third claim.

At the hearing of the cause we indicated sufficiently the reasons for considering the fourth patent, upon which the suit was brought, invalid for want of novelty and it is unnecessary to enlarge upon them now.

A decree is ordered for an injunction and an accounting as to the first of the patents in suit. As to the others the bill is dismissed. Neither party is awarded costs.

J. B. BEERS.

Artificial Crowns for Teeth.

No. 144,182. Patented Nov. 4, 1873.

No. 294.
International Tooth Crown Co
v.
Gaylord et al. } p. 24

Fig. 1.

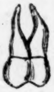


Fig. 2.

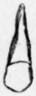


Fig. 3.

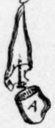


Fig. 4.

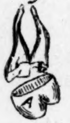
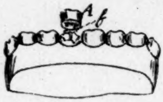


Fig. 5.



John L. Boone
C M Richardson

John B Beers
By. Dewey & Co
Attys

UNITED STATES PATENT OFFICE.

JOHN B. BEERS, of San Francisco, California.

Improvement in Artificial Crowns for Teeth.

Specification forming part of Letters Patent No. 144,182, dated November 4, 1873; application filed September 27, 1873.

To all whom it may concern:

Be it known that I, John B. Beers, of San Francisco city and county, State of California, have invented improvements in restoring broken or decayed teeth; and I do hereby declare the following description and accompanying drawings are sufficient to enable any person skilled in the art or science to which it most nearly appertains to make and use my said invention or improvement without further invention or experiment.

The usual methods employed by the dental profession for restoring decayed or broken teeth to their original size and shape is to build upon the base or exposed portion of the old teeth a new one, by condensing gold with a hammer until it has assumed the desired size and form. This process of restoring teeth is at once costly, difficult, and tedious, and the continued hammering upon the jaw necessary to build up the tooth frequently causes periosteal inflammation. Besides this process, pivot-teeth are sometimes employed, but they are very unsatisfactory.

The object of my invention is to provide a metal cap or crown socket, of the desired size and form, which can be slipped on over the projecting portion of the old tooth, and which can be secured firmly to it, so as to serve all the purposes of mastication the same as an original tooth, while at the same time effectually preventing any further decay.

In order to explain my invention so that others will understand the same, reference is had to the accompanying drawing forming a part of this specification, in which—

(Here follows diagram marked p. 24.)

Figure 1 shows the cap applied upon a molar tooth. Fig. 2 shows the cap applied upon an incisor tooth. Fig. 3 shows the cap detached from the incisor tooth. Fig. 4 shows the cap detached from a molar tooth. Fig. 5 shows the cap and screw ready to be applied to one of a set of teeth.

A represents a cup-shaped socket or hollow shell, which I make out of gold, the exterior of which is in the form of a human tooth, the closed end being made similar to the crown or point of the tooth for which it is to be substituted. To apply this shell or crown I first clean away the decayed portions of the old tooth and remove the nerves from the roots, so as to leave nothing but a healthy and solid base for the crown. The old roots should then be filled with gold, so as to exclude moisture and prevent any further tendency to decay. I then select a crown or shell of the proper size to closely embrace the projecting neck of the old tooth, and trim the edge of its open end until its nicely fits the margin of the gums or a few lines below it. When the articulation with the opposing tooth has been correctly obtained, I secure in the old tooth a gold screw, *e*, or its equivalent, so that its head will project above the tooth, as represented at *f*. I then fill the crown or shell A with oxychloride of zinc or other suitable cement, and immediately replace it upon the projecting portion of the old tooth, where it will soon become firmly fixed by the hardening of the cement.

A small quantity of enamel can be first fused into the shell and the cement filled in afterward, so that when the gold crown or wearing-edge of the gold shell wears through a hard and permanent surface will still be preserved.

I thus provide an exceedingly useful improvement in dentistry by saving the time, annoyance, and danger attending the building-up process. At the same time I provide a tooth equally reliable for all purposes of mastication as the original tooth.

Having thus described my invention, what I claim, and desire to secure by letters patent, is—

1. The hollow metal crown or shell A, for the purpose above described.

2. The hollow metal crown or shell A, when filled with a porcelain enamel or other substance, substantially as and for the purpose above described.

3. A shell or hollow crown secured upon and around the projecting portion or neck of a tooth by means of the screw *e* and a suitable cement, substantially as above described.

In witness whereof I hereunto set my hand and seal.

JOHN B. BEERS. [L. S.]

Witnesses:

JOHN L. BOONE.
C. M. RICHARDSON.

[Endorsed:] Supreme Court U. S. 1890, October term. No. 294. The International Tooth Crown Co., app't, *vs.* Edward S. Gaylord & *al.* Stipulation & addition to record. Filed Mar. 25, 1891.

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JAMES H. McKENNEY,
Clerk.

Supreme Court of the United States,

October Term, 1890.

No. 294.

INTERNATIONAL TOOTH CROWN COMPANY,
Appellant,

vs.

EDWARD S. GAYLORD and JOHN S. WILLIAMS,
Appellees.

BRIEF FOR APPELLANT.

Evening Post Job Printing House, N. Y.

Supreme Court of the United States.

International Tooth Crown Company
vs.
Edward S. Gaylord and John S. Williams.

BRIEF FOR APPELLANT.

This is an appeal from the decision of the Circuit Court of the United States for the District of Connecticut, in which Letters Patent to C. M. Richmond, granted May 22, 1883, numbered 277,941 and 277,943, were declared invalid.

The first of these patents is the most important, relating to a new dental art.

The second of these patents relates merely to the preparation of the root for the application of the denture claimed in the first of these patents.

Infringement of all the claims of these patents is admitted by the defendants (fol. 31).

The question concerning the validity of the first of these patents, No. 277,941, is an exceedingly simple one, and the facts, excepting in two particulars (which, however, are very important ones), were fairly stated by his Honor Judge Wallace in the decision of the International Tooth Crown Company against Richmond, which is, in fact, his decision in the present case, said decision being printed at the end of the record.

The two cases of the International Tooth Crown

Company *vs.* Gaylord & Williams, and the International Tooth Crown Tooth Company *vs.* Richmond (30 Fed. Rep., 775), were, in fact, one case, and were tried together under stipulation, the same testimony being used in both cases. The present record, indeed, contains certain testimony not pertinent to it, being made up from testimony in the Richmond case, of which, however, a large portion was omitted, relating to patents not here in question. Pages 118–119 of this record, for instance, have no reference to the present appeal.

The present case was a very difficult one for the complainant, for this reason, that the inventors C. M. Richmond and his brother A. S. Richmond, also assignors of other patents to complainant, had become adverse to the complainant, and a condition of great ill feeling on their part existed (see, for instance, letters of C. M. Richmond, of August 23, 1883, fols. 70–1; also the letters of A. S. Richmond, fols. 72 and 116; and Q. 9, fol. 39).

It was decided by his Honor Judge Wallace that the invention of the patent No. 277,941 is of the greatest value in the dental art. It has been, in fact, almost revolutionary in dentistry, as much so as the original Cummings dental plate invention.

That the invention of the patent is new and very useful is also shown by the proofs, and decided by Judge Wallace.

That Richmond is the first inventor of the thing in this patent, and, indeed, the originator of a new dental art, is also admitted and decided; but this patent to Richmond is overthown because Richmond had done, more than two years before his application for this patent, an operation in some respects resembling it; and the principal question, and, as we understand, the only question, for your Honors to decide in this controversy is, what is the effect of Richmond's previous operations, more than two years before the application for the patent in controversy, upon such patent?

Concerning the value of the invention in controversy there is no dispute. It is not only held by his Honor Judge Wallace to be an improvement of unusual importance, but the testimony is all one way in regard to it.

Doctor Parr, an expert and uncontradicted witness, states:

> "Q. 6. Was the operation that you have de-
> "scribed afterwards changed or varied in any
> "way by Dr. Richmond; and, if so, state how?
> "A. At that time or shortly after he found
> "that the fluids of the mouth got between the
> "porcelain and the tooth, and in some cases dis-
> "solved the cement, which was objectionable.
> "This was overcome by putting a cap which
> "covered the whole portion of the circumfer-
> "ence of the end of the band, which means the
> "end was soldered at the edges all around.
> "This made the band a great deal stronger, less
> "liable to bend, and prevented the leakage here-
> "tofore spoken of, and made a more perfect
> "and complete operation in every way, and I
> "have adopted that process entirely, and I
> "think it is in use by all dentists who make
> "this operation, and this is the way I teach at
> "the present day, and it is here illustrated by
> "'Complainant's Exhibit Model No. 2.' Exhibit
> "Richmond Sheffield Operation shows the same
> "improvement that I have referred to except
> "that the band was not beveled. Without this
> "improvement these crowns would not be what
> "they have have become to-day, because with-
> "out it they were constantly becoming loose by
> "leakage" (fol. 56).
> "Q. 8. State, if you please, what your opin-
> "ion, as a practical dentist, the advantages
> "are, if any, of the C. M. Richmond tooth
> "crown as perfected by closing the cap and de-
> "scribed in the Letters Patent to him here in
> "suit over the methods of producing artificial
> "dentures known to the art of dentistry prior
> "to the inventions referred to?
> "A. First, I claim that the crown operations
> "as that done by me to-day, and others, is the
> "only correct and perfect dentistry of the day,

“ and it is so far ahead of the old class of work
“ as laid down in medical and dental works that
“ there is no comparison and that this work has
“ created a complete revolution in dentistry.
“ The old ways are constantly going out of use
“ and this is fast taking its place. Crowns can
“ be made to resemble the natural dentures so
“ perfectly that it requires close observation or
“ a person very familiar with the work to tell
“ it, when in the mouth, from the natural
“ teeth.

“This work is entirely unlike that heretofore
“ produced, namely, when a tooth was broken
“ off or the crown decayed off it was formerly
“ customary to put what is called a peg tooth in
“ its stead. This was made by drilling the nerve
“ canal larger. Then a porcelain tooth with a
“ hole in it was ground to fit that root. Then a
“ piece of wood was made to fit the hole in the
“ porcelain; also the hole in the root. It was
“ then pressed into position. In all cases this
“ was unsatisfactory to the operator as well as
“ the patient, but as we knew of no other device
“ this had to answer the purpose.

“The objections to a tooth of this kind were
“ many. The wood would often swell and split
“ the root, which would cause the entire loss of
“ the root, and the root would be often split by
“ mastication. The wood was liable to break or
“ work loose. The wood being exposed to the
“ secretions of the mouth or the fluids of
“ the mouth, it would absorb the same and be-
“ come offensive and at the same time would
“ hasten the decay, which would soon loosen
“ the peg, and the tooth would soon drop out.

“ Now, speaking of the inventions in suit:

“ With this style of work a tooth or root that
“ has been broken down and out of use for
“ months or years can be reclaimed and made
“ to do duty as well as before the decay or dis-
“ ease set in.

“ By this way the root is encased within a
“ gold cap with a porcelain front, which approx-
“ imates in color and shape to the one lost, and
“ answers the purpose so comfortably that a
“ patient is at a loss to know whether it is his
“ own tooth, unless his attention is adverted to

" it by the sight of the gold on the inside of the
" mouth, which resembles very much a gold
" filling.

" Why I claim that this work is better than
" the old style or the work laid down in the
" works on dentistry or that formerly taught in
" the schools, is that the root is first encircled by
" a gold band which fits the root closely, going
" under the margin of the gum, protecting it
" from the fluids of the mouth, which is also a
" protection against decay and also prevents the
" root from splitting, and also giving a greater
" support in carrying the porcelain which is
" affixed thereto. Then the nerve canal is en-
" larged to receive a pin of platinum and iridium,
" which extends the full length of the root, giving
" strength thereto. Then this cap and canal is
" filled with a cement which crystallizes and be-
" comes as hard as a bone and leaves the root in a
" hermetically sealed and in a good and healthy
" condition. If the parts hereto affixed are not
" impervious to the fluids of the mouth, I claim
" that the operation is imperfectly done, and
" the result will be the same as in the old style
" of peg teeth, where the fluids get in between
" the porcelain and the root and the decay goes
" on more rapidly than if the mechanical ap-
" pliances were not affixed thereto.

" Therefore too much importance cannot be
" placed on a tight cap, as even a small hole or
" perforation would be disastrous.

" This action of the fluid of the mouth mani-
" fests itself more or less rapidly, and this I
" have only discovered by constant practice in
" in applying these dentures during a term of
" years" (fol. 57).

Dr. W. W. Sheffield says:

" Q. 16. State, if you please, and as fully as
" you can, what, in your opinion as a practical
" dentist, are the advantages, if any, possessed
" by the said inventions over former methods of
" inserting artificial teeth, and give any reasons
" for your opinion which you have?

" A. There is no comparision between these

“ perfected inventions and any methods known
“ to the profession previously. In the case of a
“ tooth presented to us so broken down that
“ filling would no longer preserve it, the early
“ method was to break away the remaining
“ fragments of the tooth, file it down level with
“ the gum, carve a piece of ivory, or by taking
“ a calf's tooth, cutting it off, drilling a hole
“ that when fitted would come opposite a hole
“ previously made in the root, inserting a piece
“ of wood into the tooth thus made or prepared,
“ the upper end of which was inserted into the
“ root, forming a dowel to hold the tooth in
“ position, it being impossible to fit the end of
“ the ivory or calf's tooth so closely to the end
“ of the root that particles of food and saliva
“ would not work between them, making a very
“ filthy condition of things, causing the ultimate
“ decay of the root, which frequently, by thus
“ being weakened, would split in the act of
“ mastication, and certainly would be funnelled
“ out by decay, so as not to hold the dowel,
“ which resulted in the loss of the root. The
“ next step was a porcelain tooth, with a hole
“ in the centre, inserted in the same manner as
“ last described, with the same disadvantages
“ of filthiness of the above described operation,
“ by the wood becoming saturated and decay
“ ensuing. The next step was a thin porcelain,
“ backed with platina, with a metal pin inserted
“ into the root and removed by an impression,
“ invested and soldered, making
“ a pivot tooth with a metal pin, the disadvantages
“ of which was the same as the above in
“ not sealing the root from the action of the
“ secretions of the mouth, thus ultimately
“ causing decay of the root. The teeth are the
“ first organs of digestion. Food improperly
“ prepared, introduced into the stomach, is
“ almost a certain cause of indigestion and
“ dyspepsia, and the nearer we can approach
“ perfect natural teeth the more complete and
“ perfect will be the mastication obtained ; and
“ with my experience, which has been very
“ large with the perfected inventions of the
“ crown, we have an instrument that is fully
“ equal for all the purposes for which natural

" teeth were made. A comparison of this " operation and any other known method of " supplying the loss of the natural teeth is only " like a comparison between a wooden leg and " a healthy, sound natural leg. In the first " place, it is a clean, sweet operation, or may be " kept so, when properly adjusted, with one-" half the labor of cleaning which ought to be " bestowed upon the natural teeth. In the next " place, it is not an artificial operation in the " sense that it may be removed from the parts. " I would further say that the roots above men-" tioned, when crowned for single crowns or by " the perfected inventions, are absolutely sealed " and protected from the action of the secretions " of the mouth which produce in the case of the " old pivot tooth sure decay and loss of the root. " I may, therefore, say that in comparing all " other crowns or systems known to the dental " profession prior to the time the inventions " here in suit were perfected, which perfec-" tion means a perfect adaptation of the " band to the root with a perfect closure without " any aperture whatever for the leakage of the " secretions of the mouth into the inner portion " of the crown dissolving the cement and " decaying the root, I may justly say, that no " denture or system of dentures was known " which could permanently preserve and ren-" der serviceable the remnants of decayed or " broken-down teeth, and, indeed, in some re-" spects acting with better results than any na-" tural tooth exposed to the same influence. " Therefore I consider the inventions here in suit " of the greatest possible utility and advantage " to the human race, and the opinions I have " expressed are not merely theoretic, but such " as I have gathered from practical experience " of thousands of my own patients whose bro-" ken-down teeth have been saved by me through " the actual application by myself of these inven-" tions, and whose cases and their continuing con-" dition is open to my inspection and could be " verified by the actual cases themselves to any " desired extent. These inventions have passed, " I may say, the period of experiment and " theory, and are now recognized as practical

" systems of dental operation of the highest " value, and this not only by myself, but by " thousands of dentists throughout the country " who are infringing these inventions, although " hundreds of them have taken out licenses " under the patents.

" Q. 17. State specifically what, if any, would " be the effect on one of the C. M. Richmond " crowns, so called and taught by him, if any " part of the enclosing cap should be left open " or constructed so as to be open?

" A. Ultimately the secretions of the mouth " would flow in and dissolve the cement " and cause the decay of the tooth, and this " would be the case even if the minutest " hole or perforation were left in the " floor of the cap exposed to the flow of the " saliva. The secretions of different mouths vary " wonderfully in their destructive action upon " the cement and on the dentine or bone of the " tooth. It is practically impossible to deter" mine without an actual test the destructive" ness of the secretions of the mouth. It may " generally be stated that the secretions of the " mouth are more or less destructive both to " cement and dentine. Some cases might be " found in which this destructive action was so " slight comparatively as to enable the cement " to resist its action for a comparatively longer " period, say three or four years, though it must " ultimately succumb to it; whereas, in other " cases, as in that of Mrs. Hewitt's, the destruc" tive action of the secretions of the mouth is so " great that even a month is sufficient to de" monstrate the inutility of the cap or Rich" mond crown without the same being perfectly " closed, as was the case in his last improve" ments on his inventions, the circumstances of " which I have fully testified to" (fol. 48).

Concerning the processes ordinarily employed before the date of the Richmond patent, Beers says, in his patent of 1873:

"The usual methods employed by the dental "profession for restoring decayed or broken

> "teeth to their original size and shape, is to "build upon the base or exposed portions of the "old teeth a new one by condensing gold with "a hammer until it has assumed the desired "size and form. This process of restoring teeth "is at once costly, difficult and tedious, and the "continued hammering upon the jaw necessary to build up the tooth frequently causes "periosteal inflammation. Besides this process, "pivot teeth are sometimes employed, but they "are both very unsatisfactory" (fol. 189).

But most important of all, after a full consideration of the testimony, his Honor Judge Wallace says:

> " It is not open to doubt that this patent describes an invention in dentistry of the greatest utility and value. The invention enables " an artificial tooth to be placed upon a natural " root, which can only be distinguished from " the natural tooth by the most critical examination, which is as serviceable while it lasts as a " natural tooth, and which is very durable. The " Richmond crown not only supplies the place " of a natural tooth for the purposes of use, so " as to be a perfect substitute for a lost tooth, " but it can be so artistically made as in many " instances to be an improvement in appearance " upon the natural tooth."

The invention itself enables the substitution in a patient's mouth of an operation so closely resembling the natural denture as to be indistinguishable from it, and which is practically superior, when the operation is correctly performed, to the natural teeth, being identical in appearance, or, in many cases superior, and being indestructable and requiring no attention.

As may be readily imagined, a result so important as this was not attained without long experiment and continuous effort.

The operation consists of two divisions: In the first place, the preparation of the root in a peculiar manner to be adapted to receive the artificial denture and to support it properly; and, in the second place, of such artificial denture.

In order that the denture shall be permanent (which is a matter of the utmost importance), it is manifestly necessary to have the denture and root so combined as that the root shall be permanently protected and supported; and this is the most important part of the present improvement in dentistry, and without it the entire operation would fail; and it is upon the accomplishment of that final step that the present invention may depend for its validity.

Long before the invention of Richmond, as stated in the testimony heretofore quoted, artificial dentures had been known, but no practical operations of this kind. These dentures did not endure; they soon occasioned destruction of the supporting root or tooth and the dislodgement of the artificial denture, so that the last state of a patient having such a denture was worse than the first.

In the present case, the question, as we shall submit to your Honors, amounts to this, whether a man may experiment for a period of more than two years toward the completion of an invention and afterwards take a patent for that completed invention, which patent, in this case, is strictly limited to the last step done by him, within the two years, and which made the invention perfect.

The invention here in controversy in the first patent in suit consists of a combination of a peculiarly prepared root with an artificial denture, consisting of a porcelain front and metallic backing, practically always of gold, and a cap connecting the artificial denture and its backing and accurately fitting the prepared root so as to make a sealing cap entirely protecting, by a continuous metal cover, the end of the root, and serving, likewise, the double purpose of supporting, as well, the root and the denture upon the peculiarly prepared root.

As shown in the patent, the root is, in the first place, cut off, having its lower surface flat and at right angles, or practically so, to the sides of the root. This form is shown in all of the drawings. The outside of the surface of the root, which is necessary to protect it, is not disturbed or injured by this operation, which is a most important feature, the preservation of the natural contour of the root being an element of the claims.

In the second place, the flat surface is essential and important in the completed operation, so as to enable the denture to be accurately supported, without danger of upsetting, upon a flat base. If the lower edge of the root were not trimmed as shown, or were cut at an angle, there would evidently be a strong tendency to displace the operation upon such root; and the continuous conjunction of the denture and root being of the utmost importance, and, indeed, essential to the success of the operation, it is plain that this feature should not be overlooked. The root is then prepared by having a considerable vertical internal cavity drilled in it, as plainly shown in Figure 3.

The next point is to prepare what is called a ferrule or cap to surround the end of the root and fit it exactly. The ferrule, as ordinarily employed, is shown in Figure 8. The patent says: "The end of "the root being then properly prepared, a ferrule *B* is "made of such a size as to exactly fit the base of "the root." An elaborate process is then described, hardly necessary to be considered in detail, excepting as showing the necessity of invention, in order to produce the completed result, by means of which process as a result, an artificial porcelain becomes attached to the metallic backing so that it completely covers the front of the denture up to the surrounding ferrule or cap, which passes beneath the gum, and is so connected as that the cap surrounding the root is a perfectly closed and sealing cap, preventing any ingress of attacking fluids upon the root. Without this, the operation would be a failure, at least in a large majority of instances. The operation being prepared, is cemented upon the root, as shown in Figure 2 in section, and in Figure 1 in perspective. The edges of the gum pass down to the upper edge of the porcelain tooth. This is possible to be accomplished by reason of the cutting away of the front of the ferrule, shown in Figure 8, thereby allowing the approach of the porcelain to the edge of the cap; and this is most important, for otherwise a rim of gold would be visible around the root in the mouth, thereby plainly indicating the fact that the denture was not natural but artificial, a point, of course, most essential to be avoided.

The effect of the operation of the patent is to make a complete sealing cap without any opening therein, presenting only a porcelain face, and this was an exceedingly difficult thing to accomplish, although when accomplished, it may be assumed to have been comparatively simple. The testimony shows through how many stages the operation went before it reached this complete perfection.

In regard to the value of this sealing cap, the patent says:

> "It will be seen that when this denture is applied to a root, the end of the root is entirely
> " protected from the injurious action of the
> " fluids of the mouth, and is hermetically sealed,
> " being covered by a closed cap. This enclosing-
> " cap is of the greatest importance, because
> " otherwise decay must necessarily take place
> " by reason of the action of the fluids of the
> " mouth on the exposed dentine, and the denture
> " would become useless. By this arrangement,
> " therefore, both the end of the root and so much
> " of the same as might otherwise be exposed to
> " the fluids of the mouth are hermetically
> " sealed, and the root is thus protected

"from the injurious effect which would otherwise result from the action of the fluids. It "is obvious, likewise, that by this arrangement "the end of the root may retain its natural configuration, and its substance is not destroyed "by cutting away or shaping the same at the "sides, which is very injurious and tends greatly "to the destruction of the root. It is obvious "that this part of my invention, namely, the "sealing cap on the end of the root, may be "used with other kinds of dentures and other "arrangements of artificial crowns besides those "shown herein, and that, when properly applied, the root is completely protected. As "shown in Figs. 2, 4 and 7, the flange of the "cap should project beneath the gum and allow "the gum to extend to the porcelain crown. "The freedom of the gum from permanent attachment with the end of the root allows this "band to be placed in position without causing "irritation. I do not limit myself to the precise "method of attaching this enclosing-cap to the "root, as other methods might be employed; "but the one here shown is the simplest known "to me.

"The caps hereinbefore described are so constructed, as set forth, as to cover and enclose "the prepared end of the root, wholly excluding "the juices of the mouth therefrom, and preventing the decay that would otherwise result" (p. 57).

The claims of the patent, all of which are admitted to be infringed, are as follows:

1. The combination of a prepared root, having its natural terminal contour near the margin of the gum, with an enclosing-cap attached thereto for supporting an artificial denture, substantially as described.
2. The combination of a prepared root, having its natural terminal contour near the margin of the gum, with an enclosing-cap attached thereto, and with an artificial porcelain or other crown supported by said cap, substantially as described.
3. The combination of a prepared root, having

its natural terminal contour near the margin of the gum, with an enclosing-cap attached thereto, the said cap being attached to the root by a pin or suitable attaching contrivance passing upward and into a suitable cavity in the root, substantially as described.

4. The combination of a tooth-crown, a metallic backing soldered to said crown, and a pin firmly soldered to said artificial backing, and secured to and passing through a ferrule adapted to surround the root, substantially as described.

5. The combination of the crown *C*, provided with suitable attaching-pins, *E*, the backing-plate *D*, and the metallic backing *N*, united to ferrule *B* and pin *Z*, substantially as described.

6. The combination of the crown *C*, metallic backing *N* united to protecting plate *D* and pin *Z*, the root *A*, and cement *J*, uniting the pin *Z* to the root, substantially as described.

In regard to the meaning of these claims, his Honor Judge Wallace has said, as follows:

> " The invention relates to an improved method " or device for attaching such crown to the " roots or stumps of natural teeth remaining in " the mouth, the object being to provide an ar- " tificial crown of improved construction, to be " adjusted and secured to the root of the natu- " ral tooth in a permanent, practical and artistic " manner, so that the tooth, when finished, will " present a natural appearance, and be capable " of the same service as a natural tooth."

His Honor has construed the claims, as they must properly be construed, to be for an artificial porcelain in combination with a suitable support, and the first three claims as limited to the sealing enclosing ferrule or cap, which is the essential point of the invention, and which is insisted upon as being its valuable novelty. For some reason his Honor has not so limited claims 4, 5 and 6. His Honor has given no reason for this difference in construction, and it seems to us not to be tenable.

The 4th, 5th and 6th claims are even more limited than the first. The apparent reason why his Honor construed the last three claims more broadly than the first is because the word "cap" appears in the first three claims, and the word "ferrule" in the last three. But the ferrule of the patent is the cap or ferrule B, Figure 8, or the ferrule B, Figure 6, which in the completed operation becomes the same as the ferrule B, Figure 8. In every instance the ferrule becomes the closed cap in the completed operation. It is not proper, therefore, to construe the ferrule B, in our opinion, as being for an open band. The ferrule of the claims is the ferrule of the description, which is a closed cap. In our judgment the last three claims are very specifically limited to the exact structure, even more specifically than are the first three.

As your Honors will be informed, whatever else may be true of the case, the enclosing cap was made by Dr. Richmond first, within two years of the date of his application, and, therefore, it becomes important to consider some of the testimony with relation to the value of this improvement, and it is also most important for your Honors to observe that in every instance in which operations made with an open cap have been produced, such operations have been failures, and have been abandoned, being removed from the mouths of the patients by reason of such failure, and this certainly is of the utmost importance in leading your Honors' mind to the belief that an improvement of substantial merit was made by Dr. Richmond in the final completion and perfection of the operation which is the subject-matter of the present patent.

Concerning the prior operations of Richmond, Judge Wallace says, after describing their method of making:

> "When made in either of these ways, the
> " denture consisted of a porcelain tooth attached

" to a ring of gold at its upper part, and, where " the porcelain itself met the ring *there was no* " *solid floor to the ring*, but the porcelain itself " impinged upon the ring."

" Among those to whom Dr. Richmond taught " the invention was Dr. Gaylord, a dentist, one " of the defendants in this cause. Two original " dentures made by Dr. Gaylord and inserted in " the mouths of patients, one in April, 1879, " and other in May, 1879, have been produced in evidence and identified; and the " fact that these tooth crowns were made " and inserted at those dates, and were practical " and successful operations, and that, with a " single exception, both were in all respects the " tooth crowns of the patent, inserted according to the method of the patent, is clearly " established. It is conceded by the expert for " the complainant that if these dentures had " been made with a ring or ferrule, having a " complete floor embracing the exposed end of " the root, they would be the tooth crowns of the " patent. One of them has a half floor of platinum back of the porcelain, under the ring, intended to partially inclose the exposed end of " the root, and the other has a partial floor, " made of loose gold foil, stuffed behind the " the porcelain, before the solder was flowed " through the back of the crown. It is insisted that when the crown is constructed in " this way it does not have the enclosing cap of " the patent, and consequently the end of the " root is not hermetically sealed. The controversy as to this patent is thus narrowed to " the question whether the substitution of a " complete floor over the end of the ferrule, so " as to wholly inclose the end of the natural " root, in the place of a partial floor, involves " sufficient invention to sustain the patent."

Now, we do not agree with the view of the law stated by his Honor in the concluding sentence above quoted, and it seems to us that your Honors will likewise differ from it.

When a man originates a new art of great value and importance to humanity, as did the inventor in the present case, beyond controversy, he generally has to complete and perfect that art or improvement through a period of years. This is especially true of the dental art. Thousands of operations have been made in dentistry, which, when placed in the mouths of the patients, seemed at first valuable and important and perfect substitutes for natural teeth, as, for instance, the pivot tooth, referred to in the testimony of the witnesses, which was a much simpler operation than the one here in controversy and its equal in appearance, but this operation was substantially entirely useless; that is to say, it might remain in the mouth of the patient for one or two years perhaps but would then certainly fail, involving great suffering and destruction of the root in the patient's mouth.

It is, therefore, beyond peradventure (and the proofs sustain the contention), that a dental operation in order to prove its value and success must remain several years in the mouth of a patient. Assuming, then, that Richmond (and the proofs go to that effect) was for a number of years experimenting, changing, altering and improving his original conception until he finally reached the perfection of the present patent, which has called forth such high praise from his Honor Judge Wallace, even when he felt compelled to defeat the patent, was not Richmond entitled to patent, at the very least, his completed perfected operation? Now, is it the law that the perfected invention must differ as radically from the last stage of the unperfected invention made by the same inventor as would be necessary to sustain a patent to an independent inventor for that perfected operation? This seems to us to be radically different from the principles announced by this Court in many cases. But wc contend that even if so rigorous a test as that were to be employed we come well within the rule, and even if the open band operation had been made by an independent inventor, still Richmond would have been entitled to patent his completed invention, because every word of proof is to the effect that the final cap, sealing, enclosing and supporting the root was essential to the final perfected operation, and that it was not a simple thing to make is most apparent from the testimony. Many different attempts have been made to secure this result. His Honor Judge Wallace, in his decision, refers to several of them. The idea might have been known to Richmond that it would be desirable to do this thing, and that it was so is evidenced from the fact that he inserted various loose floors, packed in gold foil, and made other efforts to accomplish the result, but every one of these efforts resulted in failure. He had not succeeded in making a closed cap in connection with an artificial porcelain crown until the completed invention made in New London within two years of the date of his application.

Now, concerning the value of this improvement of the closed sealing supporting cap considerable testimony has already been quoted. Other testimony is as follows:

Dr. L. T. Sheffield testifies:

> "During the summer of 1881, C. M. Rich- " mond and myself practiced this invention in " the office of my father, at New London, " Connecticut. While we were in New London " it was ascertained through the failure of sev- " eral crowns to hold their position upon the " roots to which they were attached that they " were defective, in that they were open at " the end of the cap enclosing the end of the " root at the point where the porcelain came in " contact with the cap, leaving the cement " which attached the crown to the root exposed " to the influences of the secretions of the " mouth, and the fluids filled with decomposed

"matter, which is taken into the mouth, "through this space between the porcelain and "the band. We also ascertained at this time "that the principal weakness of the crown "made with the open front end was that the "only strength of attachment to counteract "inward pressure, brought upon the face "of the tooth, was in the attachment of the "pin, as the band with no strongly soldered "head across it had not sufficient strength to "withstand such pressure, and the band, in "some instances, was separated from the crown, "and frequently in the subsequent operations "where the band had been fitted it was bent "out of its proper shape by contact with tools, "causing loss of time and annoyance. To "obviate this C. M. Richmond set himself to "work and produced an invention, the original "of which is presented here and marked 'Ex- "hibit Richmond Sheffield Operation" (fol. 35).

"Q. 7. What was the first time that Cassius "M. Richmond completely closed the cap over "one of his crowns?"

"A. The first cap that he ever closed was one "that was made in my father's office in New "London. The identical tooth is here, and "marked 'Exhibit Richmond Sheffield Opera- "tion.' This tooth was made in the summer "of 1881."

"Q. 8. What, in your opinion, was the effect "of such closing on the invention?"

"A. The operation, as C. M. Richmond was "performing it at the time that he went to New "London, seemed to be much more permanent "than it afterward proved, the fact being that "although in some cases it might last a period "of four or five or even more years, there are "many mouths in which it would not last more "than six months. It was brought very appar- "ently to our minds by the accident to the crown "made for Mrs. Alden Hewitt, as well as other "cases, and C. M. Richmond immediately pro- "posed the operation shown in "Exhibit Rich- "mond Sheffield Operation" herein. This opera- "tion has been made with a closed cap ever since "the invention was made by C. M. Richmond in "every case in my office, unless the operation

" was made against my orders and contrary to
" my wishes. I consider this operation as per-
" fection compared with the invention which I
" I originally purchased from C. M. Richmond,
" the closing of the end of the cap immensely
" increasing its strength, power of pro-
" tection against splitting the root, which
" might occur from the leverage brought
" to bear by the pin within the root when lat-
" eral pressure was brought to bear against the
" tooth, and protecting the end of the tooth as
" well as the attaching cement from the dissolv-
" ing effect of the fluids of the mouth, and by
" these means producing the most permanent
" structure ever invented as a substitute for a
" tooth crown" (fol. 38).

" Q. 10. Are you acquainted with the inven-
" tions covered by the letters patent here in suit
" —I refer particularly to the C. M. Richmond
" crown patent No. 277,941—and, if so, state,
" if you please, what is your opinion as to the
" value and advantage of said inventions com-
" pared with systems of artificial dentures
" known prior thereto, and give your reasons
" for any opinion that you may express?"

" A. I don't know that it is necessary for me
" to add anything on this point to what has al-
" ready been testified to by my father, Wash-
" ington W. Sheffield, and Dr. H. A. Parr,
" which I understand and endorse fully. My
" opinion unqualifiedly is that it is the greatest
" invention known to the art of dentistry. I
" speak of the invention of C. M. Richmond as
" finally perfected and specified in the patent
" referred to. The improvement in this system
" of crowning or bridging teeth over all other
" methods of supplying substitutes for lost teeth
" consists in its permanency, solidity, cleanli-
" ness and beauty. It is permanent because
" there are encircling ferrules around the
" necks of the teeth, having a plate of gold
" soldered across their ends, producing in-
" closing caps which, when cemented fast
" to the roots or teeth, prevent the ingress
" of any fluids which might either cause
" decay or dissolution of the attaching cement.
" The ferrule, embracing, as it does, the entire

> " end of the root, prevents any possible fracture from lateral pressure that might be " brought to bear upon the crown. The possible " dissolution of cement by the action of any " fluids which might attack it at the edge of the " band where it comes in contact with the side " of the root, is prevented by the gum under " which the end of the band protrudes, forming, " as it were, a perfect valve or stopper to the " ingress of any deleterious dissolving fluid."
>
> " This operation is more solid than any other " formerly known, for this reason, that being " fixed rigidly by means of this inclosing cap " or ferrule and the cement, no movement of " the crown upon the root can possibly take " place."
>
> " These new operations here in suit are " cleanly—indeed, more cleanly than the natural " teeth even, because the caps incasing the " roots exclude all possible deposits of food " which might decompose and become filthy."
>
> " The former systems presented none of the " advantages enumerated" (fol. 40).

Doctor W. W. Sheffield, in comparing the new operation with the Richmond old operation, says:

> " Q. 11. What was your opinion of the crown " operation which you have described?"
>
> " A. I always had doubts about the strength " of the outside band, it being of necessity so " narrow, and about the operations leaking. " The bands or ferrules frequently, in finishing " a piece, would bend and get out of position, " because of their thinness and having no support on the under side—that is to say, the " band was free, or nearly so, from the back " side of the porcelain around on the front side; " nothing to support it but the porcelain. There " was no closed joint, but simply the porcelain " resting against the edge of the band, and that " was the objection I made in the first place " about the permanency of the operation" (fol. 47).
>
> " x-Q. 40. And, as I understand you, the perfection consists in extending a flange from the

" cap covering the natural root towards or beneath the gum in such a way as to prevent the " action of moisture at the point of union between the cap and root, is that so?

" A. It is not so.

" x-Q. 41. What is it, then?

" A. The perfecting of the original Richmond " tooth crown was the perfect closure of the " bottom of a perfectly-fitting band around the " root of a natural tooth by soldering to the " edges of that band a piece of platina or gold " over the back and front surfaces or bevels of " such band previous to the affixing of the porcelain face by means of solder " (p. 37).

Mr. Brevoort, expert for complainant says :

" Q. 10. Please look at Exhibit Richmond Old " Operation and compare the same with the " operation described in the C. M. Richmond " patent, No. 277,941, with reference to the sealing of the cap?

" A. I have carefully examined Exhibit Richmond Old Operation. It consists of a porcelain tooth attached to a ring of gold at its " upper part. The tooth itself, where it meets " the ring in front, leaves an opening, so that " in no sense is a perfectly closed cap formed, " and the juices of the mouth can get inside of " the gold ring and act upon the cement put " within the said ring for the purpose of holding the artificial denture to the natural tooth. " For this reason the Richmond old operation " does not show the perfected invention set " forth in the said Richmond patent. Mr. " Earle in his deposition seems to consider that " hermetical sealing can be obtained by the " use of cement. If this is what he means, " and I think it is, it is clear that he does " not understand the hermetical sealing referred " to in the Richmond patent. The sealing intended to be described in the said patent is " first of all shown in the drawings as a hermetical sealing effected by the continuous " metal walls. Figure 2 and Figure 7 of the " patent clearly show this. The specification "says as follows: 'It will be seen that when "'this denture is applied to a root the end of "'the root is entirely protected from the injurious action of the fluids of the mouth, and "'is hermetically sealed, being covered by a "'closed cap. This enclosing cap is of the "'greatest importance, because otherwise decay must necessarily take place by reason "'of the action of the fluids of the mouth "'on the exposed dentine, and the denture "'would become useless.' This language is "clear and specific. A closing by cement "is not a hermetical closing in the sense "of this patent, because the juices of the "mouth at once act upon the cement "and whatever security the cement may have "furnished at the beginning is lost by reason of "its disintegration, and therefore Mr. Earle is "entirely in error when he states that the her "metical closing of the patent can be effected "by the use of cement" (p. 45).

"Q. 19. Will you please state whether the "continuous floor in front performs any other "function beside that of sealing the root and "from the fluids of the mouth?

"A. The plate performs another and very important function, and that is this: without the "plate the gold ring is liable to distortion, while "when the plate is soldered to the ring all "around the said ring is thus additionally "strengthened, and the denture, as a whole, "is made very much stronger" (p. 47).

Now, in addition to the advantage of the protection of the root by the closing of the cap, the evidence is (and it would not require expert evidence to convince your Honors of the truth of the fact), that the closed ferrule *B* uniting with the leveled root and firmly embracing it at its natural contour, necessarily makes, when completed with the artificial porcelain, a much stronger operation than when a half floor was employed in the band, or any other of the previous operations, because the leverage in mastication would occasionally tend to force the tooth inward, and there being no support on the outer edge of the porcelain in the half floor operations, or those in which gold foil had been stuffed in to fill crevices under the porcelain, the artificial porcelain would or might very readily be broken from the supporting band.

There are three original operations put into the case known as Exhibit Imlay, and the Searles operations, Nos. 1 and 2, claimed to have been made more than two years before the application of Richmond. Concerning the Imlay operation, Mr. Imlay, the patient, testifies (fol. 119) that he broke it from his mouth about May, 1884. Mrs. Searles had two teeth placed in her mouth, both of which were broken out (Q. 6, fol. 137). One of these teeth, according to the defendant Gaylord, who placed them in her mouth, failed by breaking directly from the root (Q. 11, fol. 129). The second had a deposit of tarter upon the root (Q. 13), proving, of course, that the end of the root could not have been protected, as described in the Richmond operation. In any event, these operations were failures, and when His Honor Judge Wallace says that "these (Searles) tooth crowns were "made and inserted at those dates and were practical " and successful operations, and that with a single "exception both were in all respects the tooth " crowns of the patent inserted according to the "method of the patent is clearly established," his attention could not have been called to the testimony. The Searles operations were both failures, and both came from the mouth of the patient from the failure of the operations in the mouth. Of course, they remained there for some time, as almost any dental operation will. A pivot tooth, an entirely abandoned and unsuccessful method of setting teeth, will sometimes remain for years in the mouth of some patients but will invariably ultimately fail. A properly made Richmond crown upon a sound root will never fail.

There is another point in the completed invention, likewise, namely, the beveling of the front of the cap as shown in Figure 8, so that the band at the front is narrower than the band at the back, which should be considered. This was done by Dr. Richmond in the early part of 1882, in the mouth of Mr. Saffold. Doctor Sheffield says:

> "C. M. Richmond removed these crowns of " Mr. Saffold, and, making new crowns, cut the " sides of the bands to conform to the points of " the alveolar process between the teeth, bev- " eled the front lower end of the band in such " manner as to allow the band to be completely " hidden by the gum upon its front surface and " to allow the upper edge of the porcelain to " come into contact with the gum" (p. 22).

Dr. Richmond says:

> "49 x-Q. I observe in patent 277,941 that, in " order to accomplish that result, you make a " bevel on the front of the band. Did you make " that arrangement first in the new operation " for Judge Saffold?
>
> "A. Yes, sir" (p. 71).

This certainly was his first operation in which a solid floor was put into a beveled band which enabled the operation to be perfected, not only in regard to the solid floor, but also so that without losing strength in the cap, the front of the cap could be concealed beneath the gum.

It is true that Richmond puts in a diagram, "Defendant's Exhibit Kallock Diagram" (fol 170), showing a beveled band, but it is very doubtful whether this was made by him at the time claimed. The original operation is not produced, but if it was, it is of no consequence; that is to say, there was no claim that that operation had a solid floor. Gold foil was stuffed in back of the porcelain to close the crevice there and no solid floor was employed.

All of these were but experimental operations upon which Richmond was laboring toward the completed and perfected operation of the patent.

Concerning his experimentation, some of the testimony is as follows: Dr. L. T. Sheffield says:

> "Mr. Saffold had had four front crowns made "by C. M. Richmond in San Francisco some time "previously. The bands of these crowns had "not been made to be hidden beneath the gum. "They were made upon their own open upper "surface with a horizontal line, instead of being "made with the depressions cut out at each "side, in conformity with the point of the alveolar process between the teeth, and therefore "making it impossible to hide them beneath "the gums. It is unnecessary to say that these "bands were very objectionable, presenting in "the mouth large bands of gold above the porcelain. C. M. Richmond removed these crowns "of Mr. Saffold, and, making new crowns, cut "the sides of the bands to conform to the points "of the alveolar process between the teeth and "beveled the front lower end of the band in such "manner as to allow the band to be completely "hidden by the gum upon its front surface, and "to allow the upper edge of the porcelain to "come into contact with the gum. Another "notable improvement in the crown was the "using of a square wire instead of a tubular "one, the square wire preventing rotation of "the tooth. C. M. Richmond was making inventions, continually improving the methods "of the production, and shortening the time of "production, by this means aiding the dentists "and saving the patent loss of time. When "these inventions were sufficiently perfected, "which was about the latter part of 1882, it "was determined to take out Letters Patent for "the United States and for foreign countries, "and the same was accordingly done, some seven "or eight patents being taken out for the United "States, so as to cover the invention and all of "its improvements, among which was the Letters Patent No. 277,941, herein sued on" (p. 22).

" RD-Q. 38. But is it not, on the contrary, a " fact that Dr. C. M. Richmond stated to you " that the subject-matter covered by that pat- " ent had been regarded by him as experimental " up to the date of its completion in New Lon- " don?

" A. The portion of this patent which was " represented to me by Dr. Richmond—shown " to me in models—was a partial result of his " experiments, of which the patent was the cul- " mination, and he stated to me that he had in " several instances removed cases representing " this partial modification of this patent for the " purpose of ascertaining the condition of the " operation after having been worn some time, " considering it experimental, and removing the " case or operation for the purpose of ascertain- " ing any defects which might be overcome or " improved by further invention.

" RD-Q. 39. How long did he continue these " observations and experiments concerning the " operation prior to the date of the Letters Pat- " ent application, in December, 1882?

" A. Continuously " (p. 29).

C. M. Richmond, the inventor, says:

" x-Q. 56. In regard to the operations which " you made previous to coming with Dr. Shef- " field, can you state approximately how many " of these were successful—I mean whether it " was not the fact that many of these opera- " tions, after having been placed in situation, re- " quired subsequent attention?

" A. They did " (p. 72).

" 119 Re-x-Q. In view of this testimony, is it " not, then, a fair statement to say that from " the commencement of your conception of this " invention until the time when you completed " it in the office of W. W. Sheffield, in New " London, you were constantly trying to im- " prove it, and were, in fact, altering your " methods of making the operation until you " reached the perfection of the patent?

" A. Yes, sir; changes were made in it every " year " (p. 127).

Again the process of the patent by which the completed operation was made was invented by Dr. Richmond subsequent to 1881. Dr. Richmond says:

> " 76 x-Q. Previous to going with Dr. Sheffield, " and previous to 1881, was not your method " of proceeding in making these tooth crowns " as follows: invariably, so far as you now " recollect, in the first place, to take a cast in " hard wax of the root in the mouth, then to " fill the impression of the root with plaster and " fit upon that plaster the ferrule or band which " was to become part of the finished tooth crown?
>
> " A. Yes, sir.
>
> " 77 x-Q. Is there any other alteration in regard to the method of attaching the porcelain " to the band which you originated after coming " with Dr. Sheffield, and which you can explain?
>
> " A. I used to invest the band with the investment material previous to adjusting the " porcelain in its position.
>
> " 78 x-Q. In the subsequent operations that " step was omitted and the porcelain was simply " waxed to the gold?
>
> "A. Yes, sir" (p. 74).
>
> The date when the Richmond new operation was made is plainly fixed in the record as being the summer of the year of 1881, and therefore within two years of the application (see L. T. Sheffield, Q. 6, fol. 35; C. M. Richmond, x-Q. 29, x-Q. 48, pp. 70–71; x-Qs. 85, 86, 87, 88, 89, 90, p. 122; Rx-Qs. 107, 119, 122).

And finally this same Dr. Richmond, a most adverse witness, the defendant in the action in which the testimony was taken, said:

> " 125 Rx-Q. I find in the patent issued to you " and to which you made oath this statement: " 'It will be seen that when this denture is ap- " 'plied to a root the end of the root is entirely " 'protected from the injurious action of the " 'fluids of the mouth and is hermetically sealed, " 'being covered by a closed cap. This enclos- " 'ing cap is of the greatest importance, because

" 'otherwise decay must necessarily take place
" 'by reason of the action of the fluids of the
" 'mouth on the exposed dentine, and the den-
" 'ture would become useless. By this arrange-
" 'ment, therefore, both the end of the root and
" 'so much of the same as might otherwise be
" 'exposed to the fluids of the mouth are her-
" 'metically sealed, and the root is thus pro-
" 'tected from the injurious effect which would
" 'otherwise result from the action of the fluids.
" '* * * The caps hereinbefore described are
" 'so constructed as set forth, as to cover an en-
" 'closed prepared end of the root, wholly ex-
" 'cluding the juices of the mouth therefrom
" 'and preventing the decay that would other-
" 'wise result.' Are not those statements in
" fact true?

"A. That is considered the most approved
" operation, I believe.

"126 Re-x-Q. As a matter of fact, then, those
" statements being true, there is that marked
" improvement, being the thing specified in that
" patent, over operations performed by you pre-
" vious to your completion of that operation;
" that is the fact, is it not?

"A. It makes the most perfect crown.

"127 Re-x-Q. And the statement of my last
" question is, in fact, true, is it not?

"A. Yes, sir" (p. 128).

The records in the Richmond case will show that not only was this witness as hostile as possible to the complainant by reason of the fact of his being the defendant in the suit in which the testimony was taken, but after having been put under preliminary injunction by the Court he had violated that injunction and had been imprisoned by the Court at the suggestion of the complainant. It is certain, therefore, that his testimony should be construed as favorably as possible for the complainant.

There will be probably no contradiction, or attempt at contradiction of the facts found by his Honor Judge Wallace, namely, that there never had been made the invention of the patent either by

Richmond or any one else more than two years before the date of application for that patent. The testimony upon that point is all one way, and we shall not burden your Honors with the full quotations of such testimony.

Concerning the Searles operation testimony will be found at questions 11 and 12, folio 63.

Another model introduced by Dr. Gaylord as evidence of the operation made by him had an intentionally open bottom (Q. 14, fol. 64). This model, however, was not a true model; that is to say, Dr. Gaylord merely said that he had made it to represent what had been taught to him by Dr. Richmond. It was supposed to be something like the Searles operations, but was, in fact, quite different.

Another operation introduced by the defendants was known as the Stellwagen crown. This seems to have no bearing upon the case whatever. It was proved by Dr. Stellwagen and was a simple gold cover for a tooth, like the Beers patent hereafter to be referred to, excepting that it had a hole through it, through which hole the cement had dissolved out (Q. 13, fol. 41). Cement in these operations is almost invariably soluble (Q. 46, fol. 45).

The testimony concerning the prior operations of Richmond himself is most unsatisfactory. No successful original operation of his is produced showing a porcelain and band or cap of any kind, and when Richmond himself is cross-examined in regard to these matters he is unable to make any definite statement. Many of the operations which he did were failures, as, for instance, the Fuller operation, testified to by Dr. Northrup, who says:

> " Q. 9. Do you know anything of the subse-
> " quent history of that operation? If so, please
> " state it.
> " A. After the operation was performed, the
> " teeth put in by Dr. Richmond were a con-
> " tinual source of annoyance to the patient—

> "uneasiness—until I finally advised their re-
> "moval and a plate inserted in the place. I
> "recommended her to Dr. Burt, and requested
> "him when he extracted those teeth to return
> "the teeth to me" (p. 105).

Dr. Richmond is unable to give the names of the people for whom he operated:

> "71 x-Q. Will you be good enough now to
> "name all the operations previous to December,
> "1880, in which you applied a porcelain face to
> "a tooth crown? I mean the names of the in-
> "dividuals and where the operation occurred.
> "I ask only for such names as you can remem-
> "ber?
> "A. I cannot recall the names of any of
> "these people that I operated for at the present
> "time" (p. 73).

Certainly the testimony of Dr. Richmond against the complainant to whom he had assigned the patent should not have much weight when his recollection is as vague as is indicated by the above answer.

The defendants have been unable to find anything in the published art anticipating in any way the inventions of the patent. They show in evidence only two things upon which they have called any witnesses, namely, the Morrison operation, described at folio 188, and the Beers patent at folio 189. These were substantially the same operations, and they consisted only in placing a gold cap over the end of a tooth, a very old operation no doubt, but radically different in every particular from the invention of the patent.

In the first place, a prepared root, that is to say, a root having its natural terminal contour and its end cut at right angles to its sides, is one of the elements of the claim. By means of that structure the completed denture is held firmly in position without any danger of being forced laterally from its support. In both the Morrison and Beers operations there was no preparation of the root of the kind specified at all. Whatever was left of the tooth was covered with a cap. In both cases there was no fitting of any band around the root, as the ferrule or cap is fitted in the Richmond operation. In the Morrison operation the dentist "took a natural tooth corre-"sponding as nearly as possible in size and shape to "its fellow of the opposite side, and imbedded its "roots in plaster to make a model from which to "get a metallic die over which to swage a gold cap" (p. 135).

In the Beers operation the patentee says: "I then "select a crown or shell of the proper size to closely "embrace the projecting neck of the old tooth and "trim the edge of its open end until it nicely fits "the margin of the gums or a few lines below it" (fol. 191). This is evidently a very different operation, even so far as that one detail is concerned, from the operation of Richmond.

In the Richmond operation the root is in the first place prepared exactly as shown in Fig. 3 of the drawings. We have here a parallel sided root, and the patentee says: "The end of the tooth being then "properly prepared, a ferrule *B* is made of such a "size as to exactly fit the base of the root" (p. 56). In the operations of Beers and Morrison, on the other hand, the roots are entirely irregular, as shown in the drawings of the Beers patent, and an attempt is made to make in one operation a complete cap which will fit the root throughout. Evidently, it would be impossible to make a tight fit in an operation of this kind.

It is also to be observed that in the Morrison operation it is impossible to make a tightly fitting cap. The cap is made in this way: The dentist selects some old tooth which he may happen to have in his possession, and which approximates as near as may be, to the tooth which he desires to cap and fits around that old tooth, or a die made in some unexplained way from it, a cap. Now, of course, that cap from the nature of things would not make an accurate fit, it being a mere matter of guesswork how nearly like an old tooth belonging to some other patient might approximate to the living tooth in the mouth of the patient to be operated upon. This is evidently not in any sense the same sealing cap as is specified in the Richmond patent, in which the band itself is accurately fitted to a root prepared to receive it, and subsequently the rest of the denture is built upon the accurately fitted band.

Also, it is to be observed that in both the Beers and Morrison operations the tooth, being necessarily larger than the neck of the root, the band must be larger than that neck, since it has to be slipped over the larger part of the tooth in order to reach its desired position upon the neck of the root. Therefore his Honor Judge Wallace was misled in his belief that Morrison used "a closed cap in order to hermetically enclose the root of a tooth."

Again, these operations are hollow. They consist of hollow caps filled with cement. They would soon wear through (fol. 191). They are in every respect different from the operations of the patent.

For some reason, not apparent, his Honor Judge Wallace entirely misunderstood the Beers operation. The Judge said:

> " If Dr. Richmond had been the first to make
> " a closed cap for a use cognate to that to which
> " it was applied by him, the question whether
> " there was any invention in making the change
> " might be resolved in favor of the complain-
> " ant."

And then went on to say, after reference to the Morrison operation, which, of course, has no bearing whatever upon the case, and is not really a tight fitting denture of any kind:

> "Another instance of the use of caps having " a tight metal floor to be inserted on the natural roots of the teeth, and having a porcelain tooth crown soldered on the cap, is disclosed in the patent granted February 3, 1881, " to John B. Beers, for an improvement in artificial crowns for teeth."

The date of the John B. Beers patent is incorrectly given, by clerical error, and should be November 4, 1873. The Judge says that this patent has a porcelain tooth crown soldered on the cap. It has not, and has no suggestion of any such operation. The Beers operation is an ordinary gold cap, and is so sworn to by the defendants' expert.

Concerning these anticipations, John E. Earle, defendants' expert, says:

> "15 x-Q. Referring more specifically to your " eleventh answer, you do not mean to say that " if the claims of the C. M. Richmond patent " No. 277,941, be limited to the operation " shown in the patent, namely, a method of " supporting an artificial porcelain crown upon " a prepared root, and producing a hermetically sealed denture around the end of that " prepared root, you will find either in 'Defendants' Exhibit Missouri Dental Journal,' " or in 'Defendants' Exhibit Beers Patent,' " the invention so limited, do you?
>
> "A. * * * * * * If, on " the contrary, an artificial denture necessarily implies that it shall be made from " different materials—that is, the cap which encloses the root and the crown, say, of gold and " the crown of porcelain attached thereto— " then I should not find such a denture in the " article in the *Missouri Journal*, as undoubtedly " the denture in that case was gold. The same " answer applies to the Beers patent. Just what " the preparation of the root in the article in the " *Missouri Dental Journal* was, I am unable to " state; but there is nothing said in the *Dental* " *Journal* as to what the special preparation of " the root to receive the artificial denture was. " In the Beers patent the specification says:

"To apply this shell or crown I first clean away
"the decayed portions of the old tooth," &c.
"As represented in the drawing of the Beers
"patent, it does not appear that there is the
"same leveling of the tooth as exhibited in the
"Richmond patent.

"16 x-Q. In your twelfth answer you have
"made some reference to a pin as part of the
"Beers artificial denture. As a matter of fact
"there is no pin forming an integral part of
"that denture as prepared outside of the mouth
"for application in the mouth, as is the case in
"the Richmond operation, but there is simply a
"headed pin or screw which is first inserted in
"the root, and the use of which is to enable the
"cement which may be placed around it when
"the denture is put in the mouth to hold more
"firmly against the root by reason of the ce-
"ment embracing the end of the pin or screw.
"That is the fact, is it not?

"A. You are correct in your statement of the
"application and combination of the pin with
"the crown and root, as described in the Beers
"patent" (p. 121).

It cannot, therefore, be seriously urged that there was any published anticipation sufficient to anticipate the patent; and in dealing with the Morrison and Beers publications Judge Wallace was manifestly misled. He says, were it not that the Morrison operation was for a hermetically closing cap and the Beers operation for a porcelain soldered upon such hermetically closing cap, then he would have sustained the Richmond patent. Now in both of these particulars his Honor was in error. It is simply necessary to look at these publications to be convinced of such error on his Honor's part. The Morrison operation is no more an enclosing cap than any other built-up gold crown, if, indeed, so much, for in the case of the old built-up gold crown a fit might have been made between the edge of the gold and the edge of the root, whereas in the Morrison operation that was scientifically impossible, because the cap was not fitted upon the root or tooth of the patient at all, but upon some other one, and morever, necessarily, must have been at its margin much larger than the root which it surrounded in order to be put in position at all; and the Beers operation is in no respect the operation which Judge Wallace supposed it to be. Therefore, even taking the logic of Judge Wallace's decision, the complainant-appellant should be entitled to prevail in the present appeal.

The invention takes its origin as far back as 1876 in an entirely novel intention to substitute an artificial porcelain for the natural tooth by banding the same, and after many failures works up to the completed invention made in the summer of 1881. Under these circumstances the original effort of the inventor, persistently carried on to the completed whole, will be looked upon as fixing a date upon which he can rely as proving his invention; and then, also it is to be borne in mind that an operation of this kind is different from a machine upon which secret experiments can be carried out in the room or factory of the inventor. Patients must be sought upon whom these experiments are to be tried, and certainly in the earlier days of working out this invention it must have required courage, both on the part of the patient and of the dentist, to have prepared and had inserted an operation as novel as the present one, involving as it did the preliminary destruction, apparently by a very painful means, of the remaining part of the tooth in the mouth.

It is obvious, likewise, that in cases of this kind the mere fact that pay was received for certain of the operations should not be counted against the inventor as indicating a sale of a completed machine, under the ordinary meaning of the law. There was only one means, apparently, of testing these inventions, which was to insert them in the ordinary practice of the dentist and study afterwards their method of operation. So that even if the completed invention had been the thing done by Richmond more than two years before the application, a claim could fairly be made that, nevertheless, the patent should be sustained. But, of course, the present case differs radically from the numerous cases in which the identical thing for which the patent was subsequently granted had been used more than two years, and in which, nevertheless, the patent has been sustained, for here the invention, narrow though it be, of the patent was made within two years of the application, and the patent is specifically based upon that last improvement.

It would be a great hardship to compel an inventor, who is working upon an art or a machine, necessarily requiring years for its test, to make application for a patent for his incomplete process or machine, or else lose all right to a patent for his completed invention.

This has never been the policy of the courts, but, so far as may be, they have always construed the section in regard to public use in favor of the inventor, so as to sustain the patent. Many of these cases are very familiar, and the principle of them seems to be well established.

In Elizabeth *v.* Pavement Co. (97 U. S., 127), Mr. Justice Bradley says:

> " But, in this case it becomes important to inquire what is such a public use as will have the effect referred to. That the use of the pavement in question was public in one sense cannot be disputed. But can it be said that the invention was in public use? The use of an invention by the inventor himself or of any other person under his direction, by way of experiment and in order to bring the invention to perfection, has never been regarded as such a use. (Curtis on Patents, Sect. 381; Shaw *v.* Cooper, 7 Pet., 292.)
>
> " Now, the nature of a street pavement is such that it cannot be experimented upon sat-

" isfactorily except on a highway, which is al-
" ways public.

" When the subject of invention is a machine
" it may be tested and tried in a building, either
" with or without closed doors. In either case
" such use is not a public use within the mean-
" ing of the statute so long as the inventor is
" engaged in good faith, in testing its operation.
" He may see cause to alter it and improve it
" or not. His experiments will reveal the fact
" whether any and what alterations may be
" necessary. If durability is one of the quali-
" ties to be attained, a long period, perhaps
" years, may be necessary to enable the in-
" ventor to discover whether his purpose is
" accomplished. And though, during all that
" period, he may not find that any changes are
" necessary, yet he may be justly said to be using
" his machine only by way of experiment;
" and no one would say that such a use, pur-
" sued with a *bona fide* intent of testing the
" qualities of the machine, would be a public
" use, withing the meaning of the statute."

* * * * * *

" Whilst the supposed machine is in such ex-
" perimental use, the public may be incidentally
" deriving a benefit from it. If it be a grist-
" mill, or a carding-machine, customers from the
" surrounding country may enjoy the use of it
" by having their grain made into flour, or their
" wool into rolls, and still it will not be in pub-
" lic use, within the meaning of the law. * * *
" Did he do anything more than the inventor of
" the supposed machine might do, in testing his
" invention? The public had the incidental use
" of the pavement, it is true; but was the in-
" vention in public use, within the meaning of
" the statute? We think not. The proprietors
" of the road alone used the invention, and used
" it at Nicholson's request, by way of experi-
" ment. The only way in which they could use
" it was by allowing the public to pass over the
" pavement."

In Smith & Griggs Co. *v.* Sprague (123 U. S., 249), Mr. Justice Matthews says:

> "A use by the inventor, for the purpose "of testing the machine, in order by experiment "to devise additional means for perfecting the "success of its operation, is admissible; and "where, as incident to such use, the product of "its operation is disposed of by sale, such profit "from its use does not change its character; but "where the use is mainly for the purposes of "trade and profit, and the experiment is merely "incidental to that, the principal and not the in- "cident must give character to the use. The "thing implied as excepted out of the pro- "hibition of the statute is a use which may "be properly characterized as substantially for "purposes of experiment. Where the substan- "tial use is not for that purpose, but is other- "wise public, and for more than two years prior "to the application, it comes within the prohibi- "tion.
>
> "On the other hand, the use of an invention "by the inventor himself, or by another per- "son under his direction, by way of experiment, "and in order to bring the invention to perfec- "tion, has never been regarded in this Court as "such a public use as under the statute defeats his "right to a patent. Shaw *v.* Cooper, 7 Pet., 292; "Elizabeth *v.* Pavement Co. 97 U. S., 126; Egbert "*v.* Lippmann, 104 U. S., 333. In this last case it "was said (p. 336): 'A use necessarily open to "public view, if made in good faith, solely to "test the qualities of the invention, and for the "purpose of experiment, is not a public use with- "in the meaning of the statute.'"

Beedle *v.* Bennett (122 U. S., 71.)

Justice Strong says, in Locomotive Safety Truck Co. *vs.* Pennsylvania Railroad Company (6 O. G., 931):

> "It was correctly said by Justice Clifford, in "Jones *vs.* Sewall (3d Vol. Patent Office Official "Gazette, 1873, p. 630), to be settled law that "the mere forbearance to apply for a patent

> " during the progress of experiments, and until the party has perfected his invention, and tested its value by actual practice, affords no just grounds for presuming an abandoment (Kendall *vs.* Winsor, 21 How., 328; Agawam Comp'y *vs.* Jordon, 7 Wall., 607)."

In *Railway Reg. Mfg. Co.* vs. *B'way and 7th Ave. Co.* (30 O. G., 180), Judge Wallace said:

> "The use of a fare register upon a street car for the purpose of experiment is not a public use which destroys the right to a patent."

In *Railway Reg. Mfg. Co.* vs. *B'way and 7th Ave. Co.* (340 O. G., 921), Judge Wheeler said:

> " An invention may be in public use for more than two years before application for the purpose of ascertaining its completeness without invalidating the patent obtained therefor afterward."

In *Paper Bag Co.* v. *Paper Bag Co.* (30 Fed. Rep., 64), the machines of the patent had been sold more than two years before the application, but the machines were finally perfected within two years, and the Court sustained the patent. The Court says:

> " The testimony, however, is conclusive on the point that these machines made imperfect bags, and that it took more than a year after the receipt of the first machine, to perfect it."

In the case of Innis *vs.* The Oil City Boiler Works (30 O. G., 998), a machine had been made and sold by the inventor more than two years before the application, but he had sold it with a view of testing it and to secure a thorough trial of it, and in that case the Judge said that the question of the length of such experimental use was one to be determined by the circumstances of the case. The evidence in the present case is all one way and to the effect that several years are necessary to demonstrate the value of a dental operation. In the above case Judge Acheson says: "It being "once shown that the use was experimental, then "upon the question of its reasonableness in point of "duration every presumption should be made in "favor of the inventor."

* * * * *

In regard to the second patent, No. 277,943, the invention is principally important as ancillary to the first invention, being useful in preparing the root for the reception of the denture. The process is well described in the fourth claim, which is as follows:

> "4. The process of preparing a root for the "reception of an artificial denture, which con- "sists in removing the crown, and then driving "into the nerve cavity a suitably-shaped piece "of wood, in removing the same and cleansing "the nerve-cavity, and in immediately plugging "or filling the upper part of the nerve-cavity by "driving in another piece of wood, substantially "as described."

There is evidence to show that a piece of wood had been used to cleanse a nerve canal (see testimony of John B. Rich), but that is practically all the evidence in anticipation of this patent. A claim was made that this operation had been taught to Richmond by Dr. Lawrence, but Richmond swears:

> "60 x-Q. You have spoken of an operation "shown you by Dr. Lawrence. Will you de- "scribe exactly what that operation was, as it "was shown to you?
>
> "A. That operation was cutting off a tooth "and destroying the nerve alive with a blow— "destroying the nerve while it was in its live "condition by a blow of the mallet and a stick "of wood whittled to conform to the shape of "the cavity occupied by the nerve.

" 61 x-Q. That was all that was shown you
" by Dr. Lawrence, as I understand?
"A. Yes, sir" (p. 72).

Attempts have been made to fill nerve canals with gold, which had generally resulted in failure, and even Dr. Rich, defendants' principal witness, made a failure of his attempts to extirpate the nerve with wood. He says:

" The method of extirpating the pulp by means of " pieces of wood being plunged into the pulp cavity " and channels has been known to me since 1842. " Between 1842 and 1845 I attempted to extirpate a " number of live pulps by plunging splinters of " wood into the nerve channels for the purpose of " cutting off the pulp from the organs that supplied " it with vitality, passing through the foramen in " the apex of the fang. This method of destroying " the vitality of the pulp proved a failure and was " abandoned for that reason.

" About the same time I made many experiments " to endeavor to fill the pulp channels after the pulp " had been removed with wood instead of gold, " which I had previously used; but, after preparing " the wood used by saturating it with various sub-" stances for the purpose of rendering it indestruct-" ible, that method was also abandoned as being " impracticable" (p. 91).

The testimony of Dr. Northrup in regard to this matter is immaterial, that is to say, he does not state that he ever performed the operation in the United States, or indeed any where else, nor does he state that Dr. Richmond ever performed the operation in his office, as will be readily seen by a study of his testimony.

There is probably enough in the proof to render the first two claims of this patent of doubtful validity; but there is nothing to anticipate the third and fourth claims. The discovery of those claims is in the *immediate filling* of the nerve cavity with a wooden plug after the previous operation. The patent states :

> "In order to avoid pain by treating the
> " tooth while still benumbed, and to prevent
> " abscess or inflammation, it is very important
> " to close the pulp-canal immediately. This I
> " accomplish by driving a second piece of wood,
> " shaped like the first, into the pulp-canal in the
> " presence of carbolic acid, filling it to its apical
> " foramen, thus perfectly excluding air" (p. 59).

That process is not shown to be old by any witness in the case. Other processes for accomplishing similar results have been shown by the proofs to have been failures, and therefore in addition to the presumption of validity from the patent itself, there is a fair presumption that the process is new and valuable, deducible from the failures of other expert dentists.

RESUMÉ.

We therefore claim and assign as error that in regard to Patent No. 277,941 his Honor Judge Wallace was in error as to the facts and meaning of the Morrison and Beers publications. That he was in error in deciding that it was necessary that the last perfected improvement of Richmond should, in order to sustain his patent, have involved invention over his last preceding experimental step to the same extent as though that preceding experimental step had been practiced by an independent inventor; and lastly, that his Honor Judge Wallace was in error in deciding that the last completed step did not involve invention, it being the basis of the completed successful practical operation of the patent, over his crude and imperfect operations practiced more than two years before his application for said patent.

And in regard to Patent No. 277,943, we assign as error his Honor's decision that said patent was void for want of novelty, the reason for such decision not being stated in said decision, and the proofs showing the contrary.

We therefore ask that the decision of the Circuit Court as to both patents be reversed.

E. N. Dickerson,
Of Counsel for Appellant.

Office Supreme Court U. S.
FILED.
APR 7 1891
JAMES. H. McKENNEY,
CLERK.

Supreme Court of the United States.

International Tooth Crown Company,
Appellant,
vs.
Edward S. Gaylord and John S. Williams,
Appellees.

SUPPLEMENTAL REFERENCE TO THE BUTTNER CROWN.

There is printed at the end of the record a patent to H. W. F. Büttner of August 16, 1881. This patent is not believed to have any special reference to the controversy. It is not referred to in the evidence. Defendants' experts do not claim that it has any bearing whatever upon the controversy, but that your Honors may be informed concerning its structure we make the following suggestions concerning it.

The copy of the patent before your Honors is incomplete, only two of the figures being shown. There is, however, sufficient there indicated to give your Honors an idea of what the structure was. The end of the root was cut into a cylindrical form by a tool not shown, but referred to in the description of Figure 4 of the specification. The tooth crown, instead of retaining its natural shape, as in the Richmond operation, is cut away to present a thin shoulder at *h*, the structure being so diminished at that point that the operation is very unsatisfactory from that reason alone. There is no statement of how the artificial porcelain B^2 (if it be an artificial porcelain, being not so named) is attached to the other portion (whatever that may be) of the operation, the statement being simply that "said " tooth B^2 being then united in the ordinary manner " with solder to the cap B^1."

In practice a set of tools are provided to cut the roots. A set of caps are likewise provided, stamped up by machinery, to fit the roots cut by the tool.

The root is cut away, exposing an edge between the margin of the gum and the tooth crown. The gum comes to about the end of the line *h*, leaving the root immediately exposed to decay. The caps are circular. No tooth roots are circular. Therefore, when the cap is placed in position the end of the root is immediately exposed in the mouth. This operation is an exceedingly unfortunate one for the patient. The complainants own this patent and have done some disastrous experimenting with it. The crowns broke off because the root had been reduced in size. The external strong portion of the root being removed, leaving only the soft interior body, the roots immediately decayed. The following drawings will exhibit to your Honors the effect of placing a Büttner crown upon tooth roots:

A **Fig. 1.**

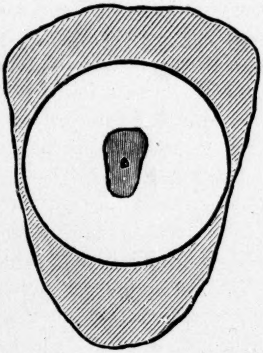

FIG. 1. Sectional view of central incisor tooth as prepared for application of Büttner crown. The shaded portion shows that part of the root necessarily left uncovered and exposed by the application of a Büttner crown.

A **Fig. 2.**

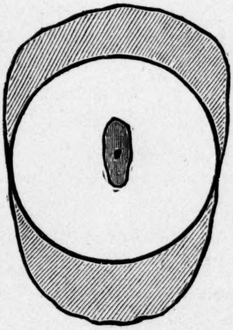

FIG. 2. Sectional view of canine tooth showing section cut to apply Büttner operation; shaded portion showing that part of the root necessarily left exposed and uncapped in applying Büttner crown.

A **Fig. 3.**

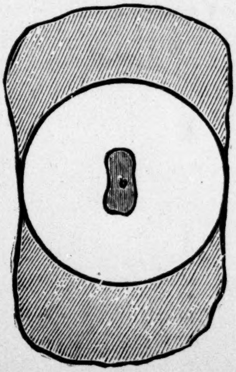

FIG. 3. Same view of bicuspid tooth showing same as above. Here the exposed and uncapped section of the root necessarily left uncovered and exposed to the action of the fluids of the mouth is very large.

These crowns are only applicable to front teeth, in any event, and when the crowns have been cut away by the Büttner instrument, the parts marked *A* necessarily remain exposed to the fluids of the mouth, which, moreover, pass over and within the gold caps, and promptly destroy the entire operation. It is one of the operations expressly distinguished against in the Richmond patent. In the Büttner patent the ends of the roots are cut away and shaped by an instrument, thereby weakening them and rendering them liable to decay. The Richmond patent says, page 2, line 5: "It is obvious, likewise, "that by this arrangement the end of the root may "retain its natural configuration, and its substance "is not destroyed by cutting away or shaping the "same at the sides, which is very injurious, and "tends greatly to the destruction of the root." And your Honors will find, likewise, as an essential element in the only claims attacked by reason of the Büttner patent, the words: "A prepared root, "having its natural terminal contour near the "margin of the gum." It is, however, we think, quite sufficient to say about this Büttner patent, that no expert has dared to cite it as an anticipation of the Richmond patent.

Judge Wallace has paid no attention whatever to this Büttner operation as bearing upon the subject matter of the Richmond invention, and when no witness in the case makes reference to a record anticipation, and when the Judge below similarly ignores such patent, we deem it improbable that the argument of counsel can persuade your Honors that such matter is important to be considered on the present appeal.

E. N. Dickerson,
Of Counsel for Appellant.

FILED.
APR 7 1891
JAMES. H. McKENNEY,

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1890.

No. 294.

THE INTERNATIONAL TOOTH CROWN COMPANY,
Appellant,

vs.

EDWARD S. GAYLORD AND JOHN S. WILLIAMS.

APPEAL FROM THE CIRCUIT COURT OF THE UNITED STATES FOR THE DISTRICT OF CONNECTICUT.

APPELLEES' BRIEF.

JOHN K. BEACH,
Of Counsel for Appellees.

C. G. Burgoyne, 146-150 Centre Street, New York.

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1890.

No. 294.

THE INTERNATIONAL TOOTH CROWN COMPANY, APPELLANT,

vs.

EDWARD S. GAYLORD AND JOHN S. WILLIAMS.

This is an appeal from a final decree rendered by the United States Circuit Court for the District of Connecticut, dismissing the bill of complaint herein.

The bill charges infringement of two letters patent, to wit: No. 277,941, to Cassius M. Richmond, dated May 22, 1883, for an artificial denture; No. 277,943, to Cassius M. Richmond, dated May 22, 1883, for a process of preparing roots of teeth for reception of artificial dentures.

In addition to the usual allegations, the bill sets forth that the defendants are estopped against contesting the validity of the patents and the fact of infringement by reason of contracts of license, which had theretofore been entered into between the complainant and the defendants respectively, which said contracts of license are alleged to have been revoked prior to the filing of the bill.

The answer admits the signing of the licenses, admits the revocation thereof, but alleges that said contracts never were of any effect or validity, for the reasons stated in the answer; denies infringement and denies the validity of the patents.

Subsequently the claim of estoppel was waived by stipulation, printed at page 17 of the record, in which the defendants admit infringement of all the claims of both patents.

The sole issue, therefore, in this Court is that of the validity of the patents in suit.

Patent No. 277,941.

This patent is for an "artificial denture" of the class known as artificial "tooth crowns;" that is to say, it is for a device intended to replace the loss or destruction of that part of a natural tooth which projects into the mouth externally to the gum, and it is intended to be placed upon and supported by the natural stump or root of the partially destroyed tooth.

The invention set forth in the patent is stated to relate to an "improved process of preparing tooth crowns" and to an "improved" tooth crown, and reference is made to a certain prior patent granted to the same patentee in 1880, upon which the present invention is stated to be an improvement.

Notwithstanding this reference in the opening of the specification, no testimony regarding the relation of this prior patent to the patent in suit was offered by the complainant, and from this fact, as well as from the omission to charge the defendants with infringement thereof, the prior patent may be assumed to describe a structure which is immaterial to this present controversy, and the reference thereto in the patent in suit may be disregarded.

We may proceed, in fact, as if the reference to the 1880 patent were stricken out as surplusage.

Shortly stated, with reference to the material point in issue, the patented tooth crown may be described as a superstructure of gold, or of gold and porcelain, resting upon a complete metallic cap or thimble which surrounds and protects the natural root of the tooth, to which root the tooth crown is securely attached by a pin projecting into the root and by cement.

The patent turns upon the complete metallic cap or thimble, which is formed by fitting a ferrule around the periphery of the root. When properly fitted the ferrule is removed, and a complete metallic floor formed inside of or upon the end of the ferrule; so that when the open end of the cap or thimble thus formed is again placed on the root it will be wholly encased in an impervious metallic casing.

The tooth crown is built so as to imitate as closely as the skill of the manipulator admits the original natural tooth, and the completed structure is cemented upon the natural root.

The conceded fact as to this alleged invention, which formed in the Court below the starting point for all discussion of the patent, is that more than two years prior to the application for this patent, to wit, prior to December 1st, 1880, the patentee Richmond was exploiting for his own profit an alleged invention of a tooth crown in very many cities of the United States, by exhibiting the same at clinics, by practicing the operation in dentists' offices, and by teaching other dentists how to make and apply this tooth crown in their private practice.

The extent of the use and sale of this tooth crown may be estimated from the fact that no less than thirty-one letters from dentists residing in fourteen different cities are printed at pages 79–86 of the record, all of which are laudatory of the tooth crown which was then being hawked about the country by the patentee.

These letters range in date from September 5th, 1878, to February 3d, 1880, and were, therefore, written more than two years prior to the application for the patent in suit.

It is not, however, necessary to examine the record at large upon this point, for the reason that we have specific proof that Richmond instructed one of these defendants and appellees, Edward S. Gaylord, in the art of making and applying this tooth crown, and was paid therefor in March, 1879.

See Record, p. 95.

No contradiction of Dr. Gaylord's evidence, that Richmond taught him something at this date for which Richmond was paid, will be found on the record, although there is a controversy as to the precise character of the tooth crown which Dr. Gaylord was at that time taught to make.

The undisputed fact is that Richmond in 1876–1880 was selling a secret, and the controversy is only as to the precise character of the thing sold.

Dr. Gaylord, on the one hand, swears that it was exactly like the tooth crowns which form the admitted subject of infringement, and, on the other hand, the complainants contend that a certain difference existed between all the tooth crowns of 1876–80, and that of the patent in suit, in that the 1876–80 tooth crowns were more or less defective, because they were made with an incomplete metallic floor in the ferrule, and for that reason the metallic cap or thimble was more or less leaky.

For all the purposes of this branch of the discussion, that is to say, to ascertain the construction which the complainants and appellants put upon the patent, we may assume for the moment that all the tooth crowns made and sold by the patentee prior to December, 1880, had some kind of a hole in the floor of the metallic cap.

The size of the alleged hole in the 1876–1880 caps is justly treated by the complainants' witnesses as immaterial. If there is a hole, they say, it makes no difference how small it is.

Indeed, it is fair to say that in the appellants' view of the patent the presence of the invention claimed therein cannot be ascertained in any specimen tooth crown, except by dissection and examination with a magnifying glass. For example, the Exhibit Searles No. 1, was apparently an anticipation of the patent until the complainants' expert discovered a hole in the metallic floor of the cap with a magnifying glass.

Before proceeding further with the argument, it will simplify the case to take this Searles Exhibit No. 1 as an example of the prior art, and to ascertain precisely what difference is found by the appellants' expert witness, Mr. Brevoort, to exist between this Searles No. 1 and the patented tooth crown; for it must be admitted that Mr. Brevoort's definition of this difference will afford as favorable a measure of the alleged invention as the appellant can ask of this Court.

That the Searles No. 1 was, in fact, made by Dr. Gaylord in April, 1879, in the practice of his profession, and as the result of Richmond's teachings, will not be disputed. The exhibit was the original tooth crown so made. About seven years after its insertion, the root upon which it was supported became loose, and the exhibit as originally put in evidence contained the root still surrounded by the ferrule of the crown. In other words the failure was in the root and not in the mechanical structure forming the crown.

The evidence concerning the construction of this exhibit is complete and exhaustive, because the exhibit was first ground away at the back and front to expose cross-sections of the bottom of the cap in front and rear, and finally the root was removed from the ferrule by Mr. Brevoort, and the cement remaining in the crown picked out with a compass point, so that the whole interior of the metallic structure was thus exposed to view.

Mr. Earle, the defendant's expert, testified first, and, in so far as he is not contradicted by Mr. Brevoort, we may assume his evidence to be confessedly true. He says that this exhibit is substantially identical with the construction shown in the patent, and that it has a floor extending completely across the ferrule and united therewith in front as well as in the rear (Record, p. 117).

Mr. Brevoort, being thus challenged to show why the Searles Exhibit No. 1 was not, as Mr. Earle declared, substantially identical with the patent disposed of, testified as follows :

> "As to Searles No. 1, I have examined it with magnifying glasses and with a microscope, and I do not find that there is a closed cap. There is a platinum floor, but it is not closed. Therefore the tooth cannot show the perfected invention of Richmond, for it does not show any hermetically closed metallic cap, and without this the said perfected invention is not found. Therefore neither Searles No. 1 nor Searles No. 2 shows the completed invention of the C. M. Richmond Patent No. 277,941."

Record, pp. 46 and 47.

Upon being asked to point out the hole to defendant's counsel, Mr. Brevoort said :

> "I indicate it to the counsel, and offer him a glass by which it can clearly be seen."

Record, p. 48.

The same witness on re-direct further particularized regarding the hole, saying :

> "I have examined Searles No. 1 carefully under a magnifying glass. I find an opening in the gold around the pin, and also another opening about the middle of the gold which forms part of the floor."

Record, p. 49.

This is the only testimony offered to rebut the otherwise uncontradicted assertion that Searles No. 1 is an anticipation of the patent. No other differences are suggested. Therefore, the exhibit stands on the evidence of appellant's own expert as a tooth crown in all substantial respects identical with the patent, except that it has one microscopic opening in the metal around the pin, and another microscopic opening about the middle of the metallic floor.

This, then, is the admitted measure of the invention.

It is manifest that the patent cannot be sustained on the ground that it is limited to the feature of cutting away or beveling the ferrule in front, for that peculiarity is nowhere mentioned in the specification.

Neither is any argument logically to be drawn in favor of the patent from the increased strength, if any, due to making the cap with a completely tight floor; because in the first place such increased strength is the obvious result of using more metal, and, in the second place, practically the same degree of strength may be predicated of Exhibit Searles No. 1. It is, we submit, putting too fine a point on it to say that any practical loss of strength resulted from these two microscopic holes in the Exhibit Searles No. 1, and we therefore deny that the patented tooth crown can be said to be stronger in any legally important degree than similar tooth crowns known in the prior art, and illustrated by Exhibit Searles No. 1. There is, in short, no other earmark by which the patented invention may be recognized, as compared with Exhibit Searles No. 1, than the "hermetically closed cap;" that is, a cap in which no hole whatever can be found with a magnifying glass.

Or, as stated in the language of the opinion filed by the learned Judges who tried the case in the Court below;

> "The controversy as to this patent is thus narrowed to the question whether substitution of a complete floor over the end of

the ferrule, so as to wholly enclose the end of the natural root, in place of a partial floor, involves sufficient invention to support the patent."

Lack of Invention.

Without intending to belittle the patent solely on the ground that a magnifying glass is needed to discover the difference between the old thing and the new, it is proper to seriously call the attention of the Court to the fact that we are dealing here with a patent for a mechanical structure which confessedly differs from an older mechanical structure of the same class only in the particular that the two very minute holes exist in the latter and not in the former.

This, it should be clearly understood, is the alleged measure of difference upon which invention must be predicated in order to sustain the patent; and this is the statement of the fact most favorable to the complainant and appellant.

It is true that great benefits are alleged to result from the stopping of this hole, but these benefits relate to a proposition in practical dentistry which is as old as the art of stopping holes in teeth, to wit, that it is desirable to exclude air and moisture from soluble surfaces.

There was, therefore, no invention or discovery of a new beneficial result by the patentee which might lend to the simple act of stopping the hole the quality of achieving thereby an unexpected result. On the contrary, the conclusion, that if the root were enclosed in a tight cap instead of a leaky one, it and the cement would be better protected than before against the solvent influence of the fluids of the mouth, was a proposition plainly deducible from the known laws of dentistry.

So obvious was this to the trained intelligence of a dentist that Dr. Washington Sheffield, a witness called by the complainant, professed to have foreseen that by reason of a leak the cement might be inadequately protected and the permanency of the operation endangered (Record, p. 32).

So much, therefore, of the appellants' case as seeks to bolster up the patent by evidence of the beneficial results of stopping the leak hole is illogical, for the reason that no mechanical act can be legally magnified by examining it through the medium of its natural and expected consequences.

It is only the unforeseen and unexpected advantages which may in some rare cases lend to a slight improvement the legal fiction of invention, and as to all other cases it is more nearly a correct statement of the fact to say that, in proportion as the obvious consequences are calculably beneficial, the mental impulse to the mechanical act becomes more ordinary and less inventive.

In the case at bar, the suggestion that the root and cement would be better protected if the leak hole were stopped was plainly the recommendation of a practical dentist and not the inspiration of an inventor.

In the evidence relating to the alleged benefit of stopping this leak hole there may be detected a flavor of exaggeration, and it must not be supposed that, as a matter of fact, the operations which Dr. Richmond was performing prior to 1880 were by any means worthless or impractical. On the contrary, it will appear from the letters printed in the record on pages 79 to 86 that the tooth crowns made and sold by Richmond prior to 1880 were received by the dental profession with a very considerable degree of favor. Indeed, the very first operation which is the subject of testimony in this record, to wit, an operation performed in the mouth of a gentleman in Chicago on Christmas Day, 1876, was a successful operation, and, for anything that appears to the contrary, is in successful use to-day (Record, p. 62). The two Searles Exhibits which were introduced in evidence were also successful operations. One of them, the Exhibit No. 2, lasted for two years, and at the end of that time failed because the supporting root was too weak to sustain the strain of mastication, and not because of any weakness or leakage in the crown itself. The other, Searles No. 1, which was made in April, 1879, was in successful operation until January, 1886—that is to say, for nearly seven years, when it failed, according to Dr. Gaylord, from the deposit of tartar upon the root. This again was no fault of the crown, and no witness is heard to say that either one of these crowns contained any inherent defect or exhibited any degree of practical imperfection due to the presence of the alleged leak.

As to the destructive effect of the juices of the mouth upon cement, it appears in the evidence that very much depends upon the individual. Dr. Washington Sheffield testified that the destructive effect of the saliva varied in different individuals, so that the cement might in some cases resist its action " say three or four years," and in another case " even a month " might be enough to destroy its sealing effect, and give the saliva access to the root of the tooth (Record, p. 34).

It does not appear exactly what kind of cement the witness was talking about. It does appear, however, that various cements were known which were air and watertight, and insoluble in the mouth.

Finally, it appears that, in spite of the very marked distinction which it is now attempted to make between these tooth crowns with partial floors and tooth crowns with complete floors, the complainants' witnesses themselves used the two forms of tooth crowns, if not indifferently at least side by side, in their own practice at the date when the testimony in the case was taken. Thus the witness Washington W. Sheffield, speaking of a date subsequent to the alleged invention, states, on page 32 of the record, that "closed caps were *almost* invariably made after that."

The witness Parr, called for complainant, stated that the total number of tooth crowns of both styles which had been put on would probably reach into the thousands, of which one-third were probably leaky caps, and that he has known some of the latter to stand for four or five years.

Record, p. 43.

It should be borne in mind, of course, that as these operations are put in the mouths of human beings with the idea and expectation that they will stay there it is not possible to procure specimens of them for introduction in evidence unless the operation has for some reason failed to remain in its place, and it is therefore not a just criticism of the '76-80 tooth crowns to say that the defendants have produced no such tooth crowns in

Court except those which have failed. On the contrary, it is a proper criticism of the complainants' strictures upon these tooth crowns to inquire why, out of the many tooth crowns of this kind which appear to have been made prior to 1880, there are no more instances of actual failure from the specific cause of leakage into the crown than appear on the face of the record.

Our answer, therefore, to the claim that the stoppage of this leak-hole involved great advantages is, first, that the advantages were those which were obvious and naturally to be expected ; and, second, that, as a matter of practice, the improvement was one of degree only, and did not mark the difference between failure and success.

As to the specific act of stopping the leak hole in these older crowns, it nowhere appears on the face of the record that any difficulty was experienced in so doing ; on the contrary, it positively appears from the statements of complainants' witnesses that, as soon as attention was called to the fact in one particular instance, that the cement had been dissolved by the leakage of the fluids in the mouth into the cap of a crown made for Mrs. Alden Hewitt, "C. M. Richmond immediately proposed the operation shown in Exhibit Richmond-Sheffield operation herein." The words quoted are the language of the witness, L. T. Sheffield, called for the complainant, at page 23 of the record. Dr. Richmond's own description of the circumstances under which the closed cap was first made will be found at page 122 of the record, and nothing is said by him of any difficulty which forbade the attempt to stop the leak hole.

If it were possible to claim that the patent covered some new process or novel means for effecting the desired result, then, indeed, it might be that invention was required to accomplish the result in the particular way pointed out in the patent. But the difficulty with that proposition is that the patentee himself declines to put his invention upon that ground; on the contrary, he says in his specification, printed at page 57 of the record, " I do not limit myself to a crown prepared by the exact process here described, as said crown might be prepared in other ways, but I prefer the process here described."

The argument, therefore, upon the defense of lack of patentable novelty, based on Searles No. 1 and the 1876-80 crowns, may be stated in the following propositions:

(1) It was not invention to suggest the stoppage of the leak-hole, for the reason that the possible danger of such leakage and the probable benefit of stopping the leak were both clearly deducible from the known laws of dentistry at the time of the alleged invention.

(2) Inasmuch as no difficulty intervened between the suggestion itself and its reduction to practice, there was no invention in the mechanical act broadly of stopping the hole.

(3) Finally, as the patent itself makes no such claim, the invention cannot be put upon the ground that the particular means described in the patent constituted the subject of invention.

Upon these three propositions the argument is fair that if the suggestion were obvious, if there were no difficulty in the adoption of it, and since no particular means of carrying out the suggestion is claimed in the patent, then the production of the patented thing, as compared with Searles Exhibit No. 1, demanded neither in its conception nor its reduction to practice any quality of the mind or hand which a skilled dentist might not reasonably be expected to possess.

Public Use and Sale More than Two Years Prior to the Application for the Patent.

It may become necessary to discuss the question whether or not the tooth crowns made and sold by Dr. Richmond and by those to whom he sold his secret prior to 1880 can be treated as part of the prior art in defense of his patent. It may be claimed that, in the eye of the law, all that Dr. Richmond did from 1876 to the so-called perfection of his invention in 1882 formed one continuous effort toward the production of the final result, or one series of experiments terminating in the perfected invention ; so that, notwithstanding the proof that certain tooth crowns, like Exhibit Searles No. 1, were made and sold more than two years prior to the application for the patent in suit, the patent may be supported on the theory that the inventor was entitled, upon perfecting his invention, to reclaim that which he had previously sold, or at least include it in some way in the same mental act of invention, so that a patent may be given to *him* (*i. e.*, to Richmond) for an improvement upon the Searles Exhibit No. 1 which could not have been obtained by a third party.

There is a certain subtlety in the notion that an individual engaged in a series of experiments directed toward the development of a perfected invention may abandon to the public for his own profit an article which marks one stage of that development without severing the legal continuity of the inventive act by so doing. But the proposition is, we submit, manifestly unsound for the reason that the concrete expression of the invention at any particular stage cannot be abandoned to the public without also abandoning to the public the right to continue and develop the idea upon the lines suggested therein. For instance, take the case of the defendant Gaylord. In 1879, more than two years prior to the application for the patent in suit, he was taught by Dr. Richmond, the patentee, to make tooth crowns like the Exhibit Searles No. 1. For that information, Dr. Richmond was paid. He sold the secret without reservation. Now the proposition comes simply to this point: whether or not Dr. Gaylord, in the exercise of that skill and ingenuity which belongs to his calling, may or may not stop the leak holes in the Exhibit Searles No. 1. In the first place, let us assume that the stoppage of those holes might be an invention; would not Dr. Gaylord be entitled to patent that invention, if he first accomplished that result? We think there can be no doubt upon this point, and, if so, it is equally clear that Dr. Richmond retained no property in the further development of the ideas suggested in the Exhibit Searles No. 1. On the other hand, if it did not involve an invention, then it seems equally certain that Dr. Gaylord, having paid for the original idea and thus become legally possessed of it, might add thereto the feature of closing the cap hermetically; and as a matter of equity and good conscience Dr. Richmond and his assignees ought to be the last persons in the world to complain.

It is difficult to follow in advance the argument which the appellants may propound upon this branch of the case, but it is certain that argument upon this line is wholly immaterial unless accompanied by an admission that there is no patentable difference *per se* between the Exhibit Searles No. 1 and the patent in suit. For, if such a patentable difference exists, why argue as to the peculiar position of Richmond, the patentee? In whatever shape, therefore, the argument is presented, it must eventually come to the point already stated, namely, that an abandonment by sale of tooth crowns like Exhibit Searles No. 1 is consistent with an intention to patent an immaterial improvement thereon, and when so stated the proposition seems sufficiently unsound on its face to require no further comment.

Anticipation.

Up to this point we have discussed the case as though Richmond, the patentee, were the first to employ hermetically sealed caps in tooth crowns, but this is not the fact.

Such a cap was described in the "Missouri Dental Journal," a publication issued at St. Louis, Mo., in 1869.

We quote from the exhibit printed in the record at page 135:

Defendants' Exhibit Missouri Dental Journal—Morrison. May, 1869.

A NEW OPERATION.

> "Miss W. came to me with a first left lower molar decayed to the extent that the entire lingual and a greater part of the labial surfaces below the gum were removed. The roots were filled properly with gold, and the crown had been filled several times: the salt time the crown was built up, in good style; but the two walls being of such shape that the filling could not be made self-retaining, I took a natural tooth corresponding as nearly as possible in size and shape to its fellow of the opposite side, and imbedded its roots in plaster to make a model from which to get a metallic die over which to swage a gold cap. I used a thin piece of pure gold plate, cutting it at the corners; giving but a slight lap for soldering after it was perfectly fitted to the die. I then fitted this cap accurately to the remaining portion of the tooth in the patient's mouth, allowing it to extend under the free margin of the gum quite to the alveolus, which was about the thirty-second part of an inch below the margin of decay. After soldering a bar across the cap from the lingual to the labial surfaces it was finished and polished at the lathe. I then prepared the patient's mouth as usual for filling; made a thin paste of oxychloride of zinc; filled the cap, and pressed it to its place; the superfluous cement was crowded out of the cap, and removed at the margin of the gum. I had the pleasure of seeing that tooth to-day nearly four months after the operation, and had the gratification of seeing and hearing it pronounced a perfect success. N."

Of this publication Mr. Earle, the defendant and appellee's expert witness, says:

> "In this article I find clearly described the enclosing cap attached to a prepared root for supporting an artificial denture, as described in the said Richmond patent" (Record, p. 114).

The complainant's and appellant's witness does not deny this, and does not refer to the article at all.

It stands, therefore, as an admitted instance of the prior publication of a clear description of the enclosing cap described in the patent.

True, it was made in a little different way, but the patentee says:

> "I do not limit myself to the tooth crown prepared by the exact process here described."

The Beers patent, printed at page 135 of the Record, also describes a tooth crown made of a tight metallic cap (see reference thereto in opinion of Court below).

The patent to Buttner, printed at page 141 of the Record, and applied for February 3d, 1881, shows and describes a hermetically tight cap formed of metal applied to a tooth crown.

As the "perfected invention" of Richmond was not made until the "summer of 1881" (Record, p. 23), the application for this Buttner patent antedates the alleged invention in controversy, and it differs from the patented tooth crown only in the fact that Buttner proposed to cut down the root of the tooth to fit the cap, while in Richmond's and in all prior tooth crowns the cap was made to fit the natural contour of the root.

For the purpose of avoiding the effect of the Morrison and Beers exhibits it was argued in the Court below that the patent in suit was limited to tooth crowns with porcelain fronts, and that as these Morrison and Beers caps did not have any porcelain front, they did not anticipate the patent.

But this construction of the patent in suit is not admissible, in view of the following language in the specification (Record, p. 57):

> "It is obvious that this part of the invention, namely, the sealing cap on the end of the root, may be used with other kinds of dentures, and other arrangements of artificial crowns besides those shown herein."

The first and second claims expressly include metallic crowns, the first including broadly an "artificial denture," the second "an artificial porcelain or other crown."

We submit, therefore, since this "enclosing cap" is claimed broadly in the first and second claims in combination with the root and with any kind of a crown, it is plainly anticipated by the Morrison and Beers crowns.

These two claims mention "a prepared root" as a member of the combination, but the only specific preparation of the root referred to in the patent is as follows:

> "A represents the root. In practice the hole *j* is drilled in the same, as shown. The end of the tooth being then properly prepared, a ferrule B is made," &c., &c.

Now, the first and second claims are independent of the hole, because they do not include the pin, to receive which the hole is drilled, and all that is required by these claims is that the end of the root should be "properly prepared."

The patent does not describe any specific preparation, and for this reason it cannot be argued that simiilar silence in the Morrison and Beers exhibits ought technically to relieve the patent from the charge of anticipation of the first and second claims.

Practically, of course, the "proper" preparation of the root goes without saying.

The third claim of the patent is for the combination of root, enclosing cap and pin, and cannot be distinguished in legal effect from the first and second claims, so far as anticipation is concerned, except on the theory that the addition of the pin to the combination lends it a novelty which it does not otherwise possess.

The same is true of the other claims.

Even if they are not, as the Circuit Court has held, independent of the tightness of the cap, and, therefore, without pretense of novelty, but are to be construed as limited to the "enclosing caps," the argument in their favor comes necessarily to the point whether it adds anything to the merit of a combination of which the sole novel feature is the hermetical closing of the cap, to recite as additional elements a number of things old in themselves, and old in the same combination with leaky caps.

In dismissing this branch of the case it is enough to point out the fact that, in order to escape, on the one hand, the charge of anticipation by Morrison and Beers, which are conceded cases of tooth crowns built upon tight metal enclosing caps, and, on the other hand, to avoid the admitted fact that exactly the combinations of the patent had been built upon leaky caps, as in Exhibit Searles No. 1, the appellants are driven to the position of claiming, in effect, that the transplanting of a known substitute (*i. e.*, a tight cap for a leaky one) into an old combination, without proof of any interfering difficulty, evidences sufficient inventive genius to warrant this Court in reversing the judgment of the Circuit Court and sustaining the patent.

Patent No. 277,943.

This patent contains claims for a series of operations to be performed on a living tooth in the mouth of a patient.

They are, of course, mechanical, but they are equally, of course, surgical.

It is not claimed that any one of the separate operations described and claimed in the patent is new, or that there is any novelty in performing them in the order stated.

Thus, the operations of cutting off the tooth, of expelling the nerve by driving in a piece of wood, and of subsequently filling the nerve cavity with a second piece of wood, were all old, and were performed in the order stated in the fourth claim of the patent which is principally relied on.

The modicum of novelty alleged consists in doing these things quickly, and it is sufficient, we think, to leave this patent with the assertion that it cannot, under any circumstances, amount to an invention in law to perform with increased speed a series of surgical operations old in themselves and in their rotation.

It is stated in the patent that the increased speed avoids much pain and danger of subsequent inflammation ; but to what is the professional art and skill of the surgeon addressed except to this very result ?

He is called a surgeon only because he knows how to do this, and to say that it involves anything more than the expected skill of his calling, to ascertain at what speed he shall perform his work to attain the best result, is absurd.

It would be a degradation of the patent system to sustain a patent which purports to restrain all other practitioners from practicing an old process of preparing tooth crowns, unless they do it slowly enough to torture their patients.

The decree of the Circuit Court was right and should be affirmed.

JOHN K. BEACH,
Of Counsel for Appellees.

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FILED.
APR 7 1891
JAMES. H. McKENNEY,
CLERK.

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, A. D. 1890.

No. 294.

INTERNATIONAL TOOTH CROWN COMPANY,
vs.
EDWARD S. GAYLORD AND JOHN S. WILLIAMS.

IN EQUITY.

Appeal from the Circuit Court of the United States, for the District of Connecticut.

BRIEF FOR APPELLEE.

CHARLES K. OFFIELD.
OF COUNSEL.

IN THE

Supreme Court of the United States.

OCTOBER TERM, A. D. 1890.

No. 294.

INTERNATIONAL TOOTH CROWN COMPANY, *vs.* EDWARD S. GAYLORD AND JOHN S. WILLIAMS.	**IN EQUITY.**

Appeal from the Circuit Court of the United States, for the District of Connecticut.

BRIEF FOR APPELLEE.

HISTORY OF THE CASE; AND PATENTS.

The record in this case is a portion of the record in a case upon four patents brought by the same complainant in the U. S. Circuit court for the Southern District of New York, against Cassius M. Richmond *et al.*, and argued before their Honors, Judges Wallace and Shipman, at the October term 1886, *i. e.*, February 22, 1887, the decision of the judges being found in the 30th Fed. Rep., p. 775 to 785.

It appears by the above identified decision that there were four of complainant's patents at issue in that litigation, and it appears by the record in this case that the same has been so revamped and agreed upon, that but two of such patents are now presented for the consideration of this court, such patents being:

First. United States Letters Patent granted Cassius M. Richmond, dated May 22, 1883, No. 277,941 for a new and useful improvement in Artificial Dentures.

Second. Letters Patent granted Cassius M. Richmond dated May 22, 1883, No. 277,943 for a new and useful improvement in preparing roots of . teeth for the reception of Artificial Dentures.

The bill was dismissed in the court below as to both of these patents, principally by reason of prior anticipations and the absence of patentable novelty, in view of the antecedent art, in the same industry.

The appellee is present in this court to insist upon the entire correctness of such finding and to briefly point out to this court in this record, those clearly proven facts which can lead to no other conclusion. It is at once evident upon a cursory inspection of the record, and of the opinion of Judges Wallace and Shipman, that the insistence in the court below and the strain of the trial, were placed solely upon patent 277,941.

The asserted invention of that patent is simple and easy to understand, and consists briefly in applying to a prepared natural root of a tooth, a crown cap of the construction shown in the drawings, and so constructed as to its intermediate diaphragm or floor as to hermetically seal by a continuous metallic casing, the end of the root, when placed in position. The changes are rung upon this alleged invention in the shape of six claims appearing in the patent, but the *invention* that gives life to the patent, if invention at all, we think we have correctly above stated.

THE INVENTION OF BOTH PATENTS 277,941 AND 277,943 DEDICATED TO THE PUBLIC BY THE PATENTEE, RICHMOND, LONG ANTERIOR TO THE DATE OF HIS APPLICATIONS THEREFOR.

The patents show that the application for 277,941 was filed December 1, 1882, and for 277,943, January 8, 1883. The defendants in this case have the deposition of the patentee Richmond herein; his testimony appearing in the record, pages 61 to 75, and 122 to 129, inclusive.

In that deposition the patentee, Richmond, distinctly states that he first fitted a gold collar about the neck of the tooth, in the city of SanFrancisco in 1875 and 1876. (Rec., 61, Q. 3.) He then distinctly testifies that he practiced all the inventions disclosed by both patents in suit at SanFrancisco, Chicago, Detroit, Cleveland, New York and New London, in the years 1876, 1878, 1879 and 1880. The exact language of Mr. Cassius M. Richmond being as follows:

A. 277,941 and 277,943. I made those two operations of everything described in both of those patents in the mouth of Rev. Isaac H. Kalloch on Christmas day, I think the year 1876. 277,943 was first shown me by Dr. Geo. W. Lawrence at Chicago in the year 1878. The month I cannot remember, but it was in the fall of 1878. I mean the invention therein described in patent 277,943. I never heard any complaint from the operation.

Q. 5. What success attended the operation in the mouth of Rev. Isaac H. Kalloch?

A. I never heard any complaint from the operation. As far as I know, it is in successful operation to-day. (Rec., 62, Q. 4, 5.)

The witness, Richmond, then goes on to state unqualifiedly that as to the invention of patent 277,941, "I prac-"ticed that operation extensively in SanFrancisco, Chi-"cago, Detroit, Cleveland and New London, Connecti-"cut, and I demonstrated it to 500 dentists in private "practice and in public clinics. That was in the years "1878 and 1879." (Rec., 62, Q. 6.)

The witness Richmond then states that as to the invention described in No. 277,943: "I demonstrated this in-"vention to a large number of dentists, including Dr. A. "L. Northrop, Dr. J. P. Hudson, Dr. E. S. Gaylord and "many others. That was in the years 1878, 1879 and "1880. I performed this operation in the mouth of Dr. "J. G. Mills, of 45 E. 31st street, New York City, also "in the mouth of Dr. E. S. Gaylord, of New Haven, Con-"necticut. I think I did both of these operations in the "year 1880."

It would be natural to regard with great suspicion, the testimony of a patentee who goes upon the stand to defeat the inventions of his patents, after they have passed into the hands of *innocent* third parties for consideration paid and received, by his testifying to such dedication and abandonment of those inventions, as to constitute a defeat of the patents; the mouth of such patentee being closed and he being estopped by reason of his required oath in the Patent Office and all matters of equity and good conscience between him and his assignor. While this may be the true rule of law and application, where the contest is between the assignee and the patentee; it surely is no matter of estoppel upon third parties when sued upon such patent, to prove the abandonment and dedication by the patentee of his invention and to prove it by such patentee himself, if the testimony of such patentee can be confirmed and endorsed by facts aliunde, such testimony; to this effect is *Sinclair* v. *Backus*, 5 B. A., 83.

Especially is this true when we consider that the patentee Richmond, at the time he took out such Letters Patent, was practically the tool and instrument of the two Sheffields, father and son, who owned all the half million dollars capital stock of the corporation complainant, each one substantially one-half of it. (Rec., 39.) And who paid all the expenses for taking out the patents (Record, 22), and who took the patentee, Richmond, into their office at New London, Connecticut, July, 1881, he then being a partner of one of the Sheffields. (Rec., 32.) The Sheffields having been previously informed, of all the facts by the patentee Richmond. (Rec., 62–3.)

The facts are abundant and convincing in this record to the acts of dedication and prior use, as follows:

Alvan S. Richmond, a brother of the patentee, Cassius M. Richmond, and entirely familiar with all of the acts of mechanical dentistry of his brother, between the year 1877 and the date of the taking of testimony, ‘stated that he became acquainted with the processes described in both of the patents in suit, 277,941 and 277,943, some time in 1878, that his brother gave clinics illustrating the inventions of both patents, and taught the dentists the inventions of both patents by practical application of the inventions in the mouths of patients in the years 1878 and 1879, at Chicago, St. Paul, Milwaukee, Grand Rapids, Detroit, Indianapolis, Cincinnati, Louisville, Columbus, Toledo, Pittsburg, Baltimore, Washington, Philadelphia, Albany, Troy, Rochester, Buffalo, Ft. Wayne, St. Louis, Springfield Illinois, Madison Wisconsin, and New York City. (Rec., 75, Q. 3; P. 76, Q. 4.) The witness testifying that the device of patent 277,941 was put in the mouth of one Dr. Ullery at Chicago, in the fall of 1878, identically the same as described in the patent. (Rec., 78; Q. 15.)

Aaron L. Northrop, an old resident dentist of New York called by the defendants, testified that he saw practically at his own office in New York City, in the fall and winter of 1878, the artificial denture inserted by the patentee, Richmond, substantially like the device of 277,941, and within twelve months from that time Doctor Richmond performed this operation some twenty-five times. (Rec., 88, Qs. 2 and 4.)

Dr. Northrop testified further that the patentee, Richmond, made use of the processes described in the patent 277,943, not to exceed three times, in putting on the Richmond crown as above indicated, and that he, Dr. Northrop, has been familiar with the process of patent 277,943 in the practice of his profession, for the last twenty years. (Rec., 88, 89; Qs. 5, 6, 7.)

John K. Imlay, a resident of New York, testified that the patentee, Richmond, placed " Exhibit Imlay " in his mouth about November, 1878, and that it remained there until 1884, when it broke off and that at the time of the taking of the deposition June, 1885, he had two other teeth of the same description in his mouth. (Record, 89, 90, Qs. 2 and 3.) This " Imlay Exhibit " is substantially the device of the Richmond Crown patent, 277,941.

The patentee, Richmond, had previously testified to the making of " Exhibit Imlay Tooth." (Record, 72, C. Q. 57.).

John B. Rich, seventy years of age, and one of the leading dentists of New York city since 1837, testified that about six years prior to the giving of his deposition (*i. e.*, six years prior to July, 1885), the patentee, Richmond, called at his office in New York city and thoroughly explained and exhibited to him by working models, etc., etc., the identical method of crowning teeth described in letters patent 277,941. (Record, 90, 91, Qs. 2, 3, 4.)

Dr. Rich was thoroughly familiar with a process of pulp extirpation described in the second patent in suit, 277,943, and testified in minutia and detail his practice of the process of the alleged invention of said Letters Patent and his familiarity with the same since the year 1842. (Record, 91, 92, Qs. 6 and 7.)

Norman W. Kingsley, a dentist in the active practice of his profession for thirty-three years past in New York city, stated that he was familiar with the patent 277941, and that the patentee, Richmond, called upon him in New York city a day or two after his arrival from Chicago, and that at that time and immediately subsequent thereto, he, Richmond, put in, in several instances, the invention and device of patent 277,941, into the mouths of patients at his office and was employed by him so to do. (Record, 93, Q. 7.)

Dr. Kingsley also testified that he thoroughly understood the patent 277,943 and that it was one of the earliest things he ever knew in dentistry and that he knew of it in 1850, he certainly did it thirty-five years ago. (Record, 92, Q. 3.)

Edward S. Gaylord, one of the defendants in this case in 1886, had been in active practice as a dentist for twenty-four years at New Haven, Connecticut. Dr. Gaylord testified that the patentee, Richmond, instructed him fully as to his process in crowning teeth in April, 1879, and performed two operations in his own mouth and that he paid Dr. Richmond at that time therefor.

This defendant witness introducing models representing the tooth crown structure taught him by the patentee, Richmond, in 1879, the witness testifying that he practiced the inventions of this patent extensively in 1879, giving, among others, in whose mouth he inserted the device, the name of Mrs. Searles. (Rec., 95, Qs. 1 to 9).

The witness Gaylord, in answer to cross-question 44, page 99, gave the full names and addresses of a large number of well-known citizens of New Haven, Connecticut, in whose mouths he placed the invention of patent 277,941, more than two years prior to the date of the application therefor.

Mrs. Caroline Searles, a witness prominently mentioned in the deposition of the defendant Gaylord, testified to "Defendant's Exhibit Searles No. 1" and "Defendant's Exhibit Searles No. 2" as being the teeth referred to in Dr. Gaylord's deposition, and made by him and placed in her mouth in 1879, remaining there until the year 1885. (Record, 101, Qs. 1–6.)

William Henry Atkinson, a practicing dentist since 1835, and a leading member of the profession, testified to his familiarity with patent 277,943; that he had known and practiced the process there described for over forty-five years, giving all the facts and details regarding the same. (Rec., 100, Qs. 1–8.)

Thomas C. Stellwagen, a dentist of Medea, Penn., describes the crowning of the natural roots by the patentee Richmond at his office in Medea in 1879, giving the details of the public exhibition of the alleged invention of patent 277,941 at his office at that time. (Rec., 129, Qs. 1–7).

In addition to the uncontradicted testimony of these numerous witnesses, there appears in this record a large number of letters of introduction and endorsement, under dates of the years 1878–9, "signed by some of the most eminent men of the dental profession," eulogizing and endorsing the invention of the Richmond Tooth Crown patent which letters were given to the public over signature of the complainant's principal witness, Lucius T. Sheffield, in his communication to the New York Times, under date of January 14, 1883, and present in this record upon pages 64 to 68, inclusive.

COMPLAINANT'S ATTEMPT TO AVOID THIS TESTIMONY, BY CONTENTION, THAT "RICHMOND TOOTH CROWNS" PRIOR TO RICHMOND'S ASSERTED INVENTION OF PATENT 277,941, WERE EXPERIMENTS.

An analysis of this testimony will show that the tooth-crowns placed by Richmond in the mouths of various parties as above indicated, in the years 1878, '79 and '80, are exactly and precisely identical with the crowns identified by patent 277,941, with the exception of the asserted absence of the particular and entirely *continuous* diaphragm or floor appearing midway in the cap; shown in the patent, and having for its purpose the hermetically sealing the root of the tooth, and protecting it from the action of the fluids of the mouth.

The testimony in this case shows conclusively, as above given, that the end of the root of the tooth had been hermetically sealed long before the application for patent 277,941.

First. By the application of cement to the end of the root and inside of the enclosed cap in locking the artificial tooth-crown in place; there can be no contest that this cement as hermetically seals the end of the root and entirely protects it, as the particular enclosing cap of Richmond, shown in patent No. 277,941, as long as it lasts, but it is contended and so asserted in the patent that the acids of the mouth will act upon, and in time will dissolve the cement and permit fluids of the mouth to attack the dentine and cause decay.

Second. That the end of the root had been hermetically sealed in the years 1878 and '79, either by soldering the crown on top of the gold band before inserting it, or by filling the gold bands when in position upon the roots with gold foil, and thus building up and making the solid gold crown. (Rec., 73; C. Q. 63 to 70.)

Third. That it also appears from the cross-examination of Richmond, that he, prior to his alleged invention of patent 277,941, used the half plate or half floor within the ferrule or band, but which did not extend to the front of the ferrule. (Rec., 127; R. C. Q. 1 to 5.) That this operation is exemplified in "Exhibit Richmond "Screw Operation."

Fourth. That the patentee, Richmond, in 1878 and 1879, in making his crowns, formed a floor of platina, gold plate, or gold foil, to fit inside and below the edge of the band as a floor for solder, and that then the piece consisting of the band, platina, or gold floor, pin and porcelain was heated up and solder flown around the pin and porcelain, making the three pieces in one. The finished structure being represented by "Exhibit Richmond, Old Opera- "tion." (Rec., 31, Q. 10,) and by the wood cuts following (Rec., 124).

Fifth. That it also appears by the uncontradicted testimony of Dr. Gaylord, that he made in 1878-9 a continuous floor to the ferrule or band with platina or gold, by cutting and fitting such floor to the band by soldering the overlapping floor to the entire top of the band, so as to form a cap when placed in position upon the root of the tooth, but that he always pierced this continuous floor in the center to allow the projecting pin to pass into the root of the tooth. (Rec., 131, Q. 46 to 53.)

Sixth. PRIOR LITERATURE, DISCLOSING RICHMOND INVENTION.

In addition to the information derived from the patent itself, the testimony of complainant's witnesses is to the effect that the invention or essence or life of this Richmond patent, is, the hermetically sealing of the exposed end of a natural root, by a closed cap for the purpose of mounting a tooth crown thereon. The principal Sheffield, so testified. (Rec., 23, Q. 8.) Whatever of invention there is in the conception or application of such a device for tooth crowning purposes, was disclosed and made public in five well known publications, and patents long anterior to any asserted date of the conception thereof by Richmond.

1. "DEFENDANT'S EXHIBIT, MISSOURI JOURNAL, MORRISON, MAY, 1879."

Under the head of a "New Operation," there appears in the above journal exhibit, a description of the application of a tooth crown forming an enclosing cap and hermetically sealing the projecting end of the natural root, so closely analogous to the hermetically sealing tooth-crown device of Richmond as to make it impossible to distinguish the one from the other, as to the claimed invention. (Rec., 135.)

2. JOHN B. BEERS' 1873 PATENT.

A study of this patent discloses the fact that it is scarcely possible to differentiate the device of this Beers patent from the assserted invention of Richmond, 277,941. Beers says: "The object of my invention is to provide a "metal cap or crown socket of a desired size and form, "which can be slipped on over the projecting portion of "the old tooth and which can be secured firmly to it, so "as to serve all the purposes of mastication, the same as "the original tooth, while at the same time effectually "preventing any decay. * * * I then fill the crown "or shell A with oxychloride of zinc or other suitable "cement and immediately replace it upon the projecting "portion of the old tooth where it will soon become "firmly fixed by the hardening of the cement." This patent appears upon Record, page 136.

3. "DEFENDANT'S EXHIBIT DENTAL COSMOS, TALBOTT, SEPT., 1880."

Under the heading of "Gold Crowns," Dr. Talbott, in September, 1880, published a communication explaining at length his modification of his practice of the invention of the above Beers patent. Dr. Talbott in such communication says: "Do not undertake to fit a gold crown on "an old root, unless there is sufficient left of the broken "or decayed tooth above the surface of the gum to allow "a band of gold to encircle it. * * * Fit a stout "gold band around the neck of the tooth. See that it "fits exactly. Then strike up in a piece of lead, a gold "crown, the size required, and run some gold solder into "it to make it strong; file it down; adjust and solder it "neatly on the gold band that fits the tooth. This will "give the exact form of a molar and make a perfect "cap or crown for root. * * * The cement found "most suitable in fastening on these crowns is the German os-artificial." (Rec., 138.)

4. BUTTNER AUGUST, 1881, PATENT.

This patent shows that Buttner, substantially prior to the date of the application for Richmond's 277,941 patent, in the most effective manner applied caps to the roots of the natural teeth, hermetically sealing the same and building thereon any desired crown; the descriptive matter of such patent identifying such structure and effect; being as follows:

"The invention consists in turning down the upper end "of the tooth root, so as to form a circular shoulder "thereon, the irregular upper surface of tooth being "cut off in a horizontal plane to accurately fit the "metallic cap which carries the artificial crown; and it "further consists of a metallic cap composed of a ring, "circular plate and central pivot, the ring fitting upon "the shoulder of the root, the pivot fitting upon the "shoulder of the root, the pivot tightly fitting into the cen-"tral hole made in the root, and the plate fitting closely "and air-tight upon the plane upper surface of the root "and uniting the ring and pivot; and the process consists "of enlarging the nerve canal of the tooth root with a "suitable tool, in then cutting off the upper surface of "the root on a perfect level, and in then cutting away the "walls of the root to form a circular shoulder thereon. "A cap is then prepared to fit the root, and has an arti-"ficial crown suitably attached to it, and is then fitted "upon the top of the said root and forced down thereon, "so that the pivot shall enter the central hole, the ring "encircle the shoulder and the plate fit closely on the "plane top."

Defendants Exhibit Dental Cosmos, Crouse, 1879.

An examination of this publication "exhibit," shows that in the year 1879, Dr. Crouse, by public communication, commended the Richmond Tooth Crown as a device of great value to the dental profession at that date, and that he had practical knowledge of such fact.

Dr. Crouse is one of the most eminent and active members of his profession, and his demonstration of the fact, as appears by this article, that the Richmond Tooth Crown of 1879 was capable and actually performed the service of supporting two teeth upon one root, puts a quietus upon the suggestion appearing in Sheffield's testimony, to the effect that the Richmold 1879 Tooth Crown was so lacking in strength as to necessitate the complete capping or continuous floor to secure its practicability.

In our view of the above amply proven facts, it is utterly futile for the complainant in this case to attempt to sweep out of this record the antecedent tooth-crown work of the patentee Richmond, as such work was accomplished by him prior to his admitted conception of the alleged invention of patent 277,941 in the summer of 1881—as an experiment, completed or continuing.

The record in this case is abundant in proof that such tooth crowns were entirely practical and successful, as for example: the tooth crown put in for Mr. Kallock in San Francisco in 1876; and in the mouth of that party, and remaining there until the time of the taking of Richmond's deposition in 1885, for aught that appears otherwise; also from the fact that the Richmond crown operation was practiced extensively and publicly throughout the principal cities of the United States by Richmond, and demonstrated by Richmond to five hundred dentists in private practice; and explained in public clinics; in the years 1878 and '79, in such cities (Rec., p. 62, 75-6), and this fact is supported by all of defendant's witnesses.

It is also perfectly apparent from this record that the dentists in 1878 and '79 *paid the patentee Richmond* for such instructions and demonstration, and thereafter practiced the asserted invention themselves, as evidenced by the deposition of

Dr. Gaylord, p. 95, Q. 5 and 6.
Dr. Northrop, p. 107, Q. 18, and
Dr. Kingsley, Record, p. 92, Q. 3.

We apprehend that the true rule of law applicable to these facts is tersely and correctly stated in the opinion of Judge Blodgett in *Lyman* v. *Maypole*, 19 Fed. Rep., 736, viz:

> "The law permits an inventor to construct a machine "which he is engaged in studying upon and developing, "and place it in friendly hands for the purpose of testing "it and ascertaining whether it will perform the functions "claimed for it; and if these machines are strictly experiments, made solely with a view to perfect the device, "the right of the inventor remains unimpaired, but when "an inventor put his incomplete or experimental device "upon the market and sells it as a manufacturer more "than two years before he applies for his patent, he gives "to the public the device in the condition or stage of development in which he sells it."

The long quotation by the learned counsel for the complainant from the decision of Mr. Justice BRADLEY in *Elizabeth* v. *Paving Co.*, 97 U. S., 126, is unfortunate indeed when the whole decision is read and applied to the facts in this case.

The entire opinion of that case shows that Nicholson constructed the pavement in question by way of an experiment, for the purpose of testing its qualities. The road in which it was put down, though a public road, belonged to the Boston & Roxbury Mill Corporation, which received toll for its use, and Nicholson was a stockholder and treasurer of the corporation.

The pavement in question was about seventy-five feet in length and was laid adjoining the toll-gate and in front of the toll-house. It was constructed by Nicholson at his own expense, and was placed by him where it was, in order to see the effect upon it of heavily loaded wagons and of varied and constant use, and also to ascertain its durability and liability to decay. (Page 133.)

The opinion discloses further that Mr. Nicholson was upon the pavement " almost daily " to examine it, " that " he would often walk over it, cane in hand, striking it " with his cane and making particular examination of its " condition;" that he always spoke of it as "an experi-" ment.'

The opinion of the court being "that Nicholson merely " intended this piece of pavement as an experiment to " test its usefulness and durability." The court in that case then asserts a recognized proposition, that is equally applicable to the case here present, viz: " The abandon-" ment of an invention to the public may be evinced by the " conduct of the inventor at any time, even within the " two years allowed by the statute."

The learned justice then makes the following statement of law and fact, which is at once fatal to the contention of the complainant in this case, viz:

" Had the city of Boston or other parties used the in-

"vention by laying down the pavement in other streets "and places with Nicholson's consent and allowance, then, "indeed, the invention itself would have been in public use "within the meaning of the law; but this is not the case. "*Nicholson did not sell it nor allow others to use it or sell* "*it. He did not let it go beyond his control. He did* "*nothing that indicated any intent to do so. He kept it* "*under his own eyes and never for a moment abandoned* "*the intent to obtain a patent for it.*" (The italics are ours.)

How directly in contrast is the above case from the applied facts of the one under discussion here; in these principal respects!

1. Richmond perfected his invention as early as 1876, and continually used it in the form perfected until the summer of 1881, without any thought or suggestion as shown by the record, that there was any element of experiment in connection with it.

2. That he abandoned this invention to the public for a period of five years, by publicly practicing it.

3. That he sold his tooth crowns to the public and took pay for his employment in producing the same, more than two years prior to the date of his application for patent 277,941.

4. That he not only permitted and allowed others to use his invention, but instructed them so to do and such parties so instructed, during the years 1878 and 1879, practiced his now alleged experimental inventions publicly, without any thought that the same was not perfected, or were, anywise an experiment.

A citation in complainant's brief from the decision of Justice Strong in *Locomotives Safety Truck Co.* v. *Penn-*

sylvania Railroad Co., 6 O. G. 630, is equally unfortunate in its boomerang effect upon complainant's contention. In that case Mr. Justice STRONG says, in the closing paragraph of his decision:

" *There is an obvious distinction between a public use, or* " *a use by the public, and an experimental use in public.*"

We respectfully submit that the use of the Richmond crowns during the years 1878 and '79 by five hundred dentists throughout the United States, and this by the direct instruction and authorization by Richmond under value received, " is a public use or a use by the public " and cannot by any contortion be twisted into " an experi- " mental use in public."

In the case of *Egbert* v. *Littman*, 104 U. S., 336, Mr. Justice WOODS, in delivering the opinion of the court says:

" We observe in the first place that to constitute the " public use of an invention, it is not necessary that more " than one of the patented articles should be publicly used. " The use of a great number may tend to strengthen the " proof, but one well defined case of such use is just as " effectual to annul the patent as many; * * * if an " inventor having made his device, gives, or sells it to " another to be used by a donee or vendee, without lim- " itation or restriction, or injunction of secrecy, and it is " so used, such use is public, even though the use, and " knowledge of the use may be confined to one person."

In the case of *Howes* v. *McNeil*, 5 B. & A., 84, the opinion of Mr. Justice BLATCHFORD, at the Circuit, says in substance, that while an inventor may permit others to use his invention as tests or experiments within the two years allowed by the statute, it is a prior use or dedication by the inventor, "if the tool or thing patented has "been sold more than two years before the application."

In the case of *Henry* v. *Stove Co.*, 5 B. and A., 110, LOWELL, J., says:

"In my opinion the evidence tends to show a sale of "the invention; true, some sales were conditioned—that "is to say, the stoves were to be returned if they were "not satisfactory to the buyers; but this does not, with-"out further explanation, prove that they were experi-"mental."

In the case of *Pitts* v. *Hall*, 2 Blatch., 235, Mr. Justice NELSON says:

"The patentee may forfeit his right to the invention if "he construct it and lend it to others to use, or if he uses "it publicly himself in the ordinary way of a public use of "a machine at any time prior to the two years before he "makes his application for the patent."

To the same effect are

Fruit Jar Co. v. *Wright*, 94 U. S., 94.
Jones v. *Sewell*, 6 Fish., 364.

A SEEMINGLY INFALLIBLE TEST OF INVENTION; APPLIED.

The decisions of this court, while not defining the precise limit of application to the term invention, have certainly laid down certain guiding directions which clearly define what is, not invention, as for example: in *Pierce* v. *Mulford*, 102 U. S., 118. Mr. Justice STRONG, speaking for this court, says: "But all improvement is not inven-"tion, and entitled to protection as such. Thus to entitle "it, it must be the product of some exercise of the in-"ventive faculties, and it must involve something more "than what is obvious to persons skilled in the art, to "which it appertains." Again in *Atlantic Works* v. *Brady*, 107 U. S., Mr. Justice BRADLEY delivering an opinion of this court, thus states the proposition: "It was "never the object of those laws to grant a monopoly to "every trifling device, every shadow of a shade of an idea, "which would naturally and spontaneously occur to any "skilled mechanic or operator in the ordinary progress of "manufactures." Again in *Hollister* v. *B. & B. Mfg. Co.*, 113 U. S., 59, Mr. Justice MATHEWS, in speaking for this court, says:

"Novelty and increased utility in an improvement upon "previous devices do not necessarily make it an inven-"tion. A device which displays only the expected skill "of the maker's calling, and involves only the exercise "of ordinary faculties of reasoning upon materials sup-"plied by a special knowledge and facility of manipula-"tion resulting from habitual intelligent practice, is in no "sense a creative work of inventive faculty, such as the "Constitution and the patent laws aim to encourage and "reward."

Now for the application of the above rule to the case at bar. It appears undisputed by this record that the first necessity made manifest for the asserted invention of patent 277,941, arose out of an accident to an old Richmond crown tooth, put on by the patentee, Richmond, for one Mrs. Alden Hewitt, before mentioned; happening in the summer of 1881, and that the identical tooth showing such invention is here present as "Exhibit Richmond Sheffield Operation." (Rec., 23; Q. 7 to 8.)

The testimony of the principal Sheffield witness, is that the patentee, Richmond, upon seeing the condition of this Hewitt crown "*immediately proposed the operation*

" *shown in Exhibit Richmond Sheffield Operation.*" (Rec., 23; Q. 8.)

The trivial character of this slight change in the tooth crown made for Mrs. Alden Hewitt, was most perfectly illustrated by a question asked in the cross-examination of the patentee, Richmond. Referring to that operation:

" C. Q. 88. What was the purpose of continuing that " cap and soldering it tight outside of the mouth and be- " fore application?

" A. *I do not know that any idea was in my mind at* " *the time that this was made.* I remember Dr. Sheffield " saying something about it when I gave it to him as a " model."

Under these facts, how can it be contended that there was any *invention* exercised by Richmond, when (to use the language of the decisions), the change made was perfectly " obvious " to meet the defect and " spontaneously occurred " to the skilled mechanic or operator when confronted with the problem to be solved, and was only the " expected skill " of a mechanic " resulting from habit- " ual intelligent practice," and the act was so natural and common as not to have aroused any suspicion in the mind of the inventor, that he had done anything unusual.

How clearly apparent is it, that even a party unskilled in the dental crown industry, would, when he knew that the half cap would only exclude the acids of the mouth from the root to the extent of its application, continue and entirely cover the root by a complete cap casing, if any necessity was apparent therefor.

The learned counsel for the complainant makes the statement upon the second page of his brief " that it was " decided by his honor Judge Wallace, that the invention "of the patent 277,941, is of the greatest value in the "dental art," and upon page 9 of his brief, quotes that clause of the opinion, upon which such statement is based. We most respectfully differ therefrom in our reading and, translation of Judge Wallace's decision, as to this particular subject-matter, if the same is asserted to mean anything other or different than that the tooth crown invention of Richmond, made and used by him and others prior to the application for Letters Patent 277,941, was of great value and utility.

The true meaning of Judge Wallace's eulogy of the "Richmond crown," is shown by the following quotation from his opinion: "And it is now too late to deprive the "public of what became rightfully theirs by supplementing to the invention a mere matter of mechanical im"provement, which in itself had no patentable novelty."

DEFENDANT'S NON-INFRINGEMENT.

It is admitted by the defendants upon page 17 of the record as follows: "It is stipulated that the defendants "herein admit infringement of all the claims of letters "patent of the United States to Cassius M. Richmond, "May 22, 1883, No. 277.941, and to Cassius M. Rich"mond, May 22, 1883, No. 277,943."

This admission must certainly be taken and considered in view of the facts proven in this record, such facts being that "Defendants Exhibit Searles No. 1," and "De"fendant's Exhibit Searles No. 2," stand for and represent the uniform dental tooth crown work put in by the defendants both before and after the granting of patent 277,941, Record, page 134; R. D. Q., 75, 76 and 77, and that such tooth crowns were first put in by the defendants in April, 1879, more than two years prior to the date of the application for patent 277,941.

It follows conclusively then that if the device of these exhibits and this tooth crown work of the defendants, is an infringement of patent 277,941, it is clearly an anticipation of it, and results necessarily in the defeat of the patent, and the consequent dismissal of the bill of complaint as to such patent.

THE ASSERTED INVENTION OF 277,941—APOCRYPHAL.

It is difficult and seemingly impossible to see wherein there is any room for invention in any device shown in this Richmond patent 277,941, in the face of the above uncontradicted facts and admissions as to the prior state of the art shown in this record. It is contended, however, by the learned counsel for the complainant, that the device most closely approximate to the precise thing of the Richmond tooth crown device in suit is a tooth crown having a half or partially enclosing floor or cap referred to and identified in the third clause above, and admittedly old by Complainant's Sheffield witnesses, and that there is disclosed marked invention over this structure in the unbroken continuous enclosing cap of the Richmond patent in suit.

We most earnestly and emphatically traverse any such suggestion, and can find no authenticated facts appearing in this record upon which it can be founded, but upon the contrary, find that the whole drift and trend of the facts of the record are otherwise.

In the first place it is not by any means proven in this record that the presence or absence of the cap or continuous floor is of any practical consequence. Hundreds of instances are testified to of the application of the cap without the continuous floor, and of the entirely satisfactory character of such device, without any of the attendant defects or disadvantages suggested by the Sheffields alone in their testimony.

The testimony of the Sheffields themselves show that the closed caps were not invariably used after the asserted invention of 277,941. (Rec., 32, Q. 14.) Dr. Henry A. Parr, the only dental witness called by the Sheffields in their behalf, would only testify that out of the number of thousands of Richmond Crown Caps, put in, to his knowledge, since the Richmond patent, not more than two-thirds or three-quarters were solid enclosing caps. (Rec., 43, Qs. 11, 12.)

As a matter of fact, the only and specifically identified instance of the application of the complete enclosing cap found in this record, precisely as shown in the Richmond patent 277,941, is found on page 23 for Mrs. Alden Hewitt.

The conclusion is irresistable from a study of this record, and is largely derived from the study of the testimony of complainants witnesses, that the patent 277,941 is a skillfully and artfully drawn paper having admittedly nothing new therein, except the covering of the entire exposed end of the root by a whole instead of a half cap floor, that such addition was simply a most trivial mechanical act; and the expressing of the same in the form of Letters Patent was entirely for the purpose of bolstering up and giving effect by way of a patent monopoly to a device that had been long abandoned to, and in use by, the general public.

RICHMOND PATENT 277,943.

This patent was practically dismissed from the bill of complaint upon the hearing of the case in the court below, as appears by the opinion of Judges Wallace and Shipman, and is not dignified in the opinion by any discussion whatever, the court contenting itself with the simple announcement of the invalidity of the patent for want of patentable novelty. The testimony of all of defendant's witnesses, herein quoted, is to the end and effect that everything of value shown in patent 277,943 was old and elementary in dental practice for forty years past.

The learned counsel for the complainant, in his extended brief, seems to treat this patent as worthy of but slight discussion, and we shall content ourselves by referring to it only in such cavalier manner and as being too trivial and unimportant to merit discussion—one of those large numbers of letters patent, in fact, that is void on its face for want of patentable novelty.

PERTINENT RETROSPECT.

The above complainant is a corporation organized under and pursuant to the laws of the State of New York, and the record of this case does not disclose that such corporation is anything other than a paper affair, organized for the purpose of holding by *mesne* assignments, large numbers of letters patent relating to applied dentistry, and having no other object or view than the accumulation of profits and dividends by assessments and levies made upon the dental profession throughout all parts of the United States, under the guise of licenses of such letters patent, having the appearance of danger and peril to such dentists, by reason of their aggregation of number.

The complainant corporation being in nowise a producer, or itself practicing or employing the alleged inventions of its numerous patents, we assert with confidence that it is pertinent to the merits of this case and the object and merits of this complainant, that reference be made to the dental profession and the past relation and position of its members to the patents of this and analogous companies in this country, for more than a quarter of a century past.

It is a fact well known to most of the learned justices of this court, that beginning more than a quarter of a century back the individual members of the dental profession have been subjected to harassment and litigation in every Federal circuit of the United States, by corporations organized for the especial purpose of purchasing and holding patents relating to the various branches of dentistry, and demanding tribute from each member of the dental profession, and bringing suit in the federal courts to enforce apparent claims in case of refusal. The principal illustration of this fact so notorious and prominent that it is believed that this court will take judicial notice thereof, as a fact, was the litigation of the Goodyear Dental Vulcanite Company, carried on by a New York corporation for more than fifteen years against thousands of individual dentists in all parts of the United States.

During that time the dockets of the various federal Circuit courts were simply clogged with these "vulcanite "cases." A generation of dentists were impoverished by litigation, and there are still thousands of judgments standing upon the dockets of the courts, obtained against younger members of the dental profession, so burden-some as to costs and judgments as to completely bar, or greatly discourage any attempt of their payment or removal.

This condition of affairs appears all the more unfortunate for the dental profession, when we consider that as a profession there are few, if any, of great or even ordinary wealth, and there are many of great poverty, wholly unable as individuals to defend themselves in any court; and that had the re-issued letters patent in that litigation been subjected to the same rule of construction, comparison and analysis, as applied to re-issued patents since the Miller–Bridgeport Brass Co. case, its invalidity would seem to have been a matter of certainty.

In the case of *Smith* v. *Goodyear Dental Vulcanite Co.*, 93 U. S., 502, the three learned Justices of this court delivering the dissenting opinion, used the following language:

" It is too common a case that associated companies in
" order to maintain some valuable monopoly, look about
" to see what abandoned invention or rejected application
" or ineffective patent can be picked up, revamped, and
" carried through the patent office, and by the aid of in-
" genious experts and skillful counsel, succeed in getting
" the desired protection."

We most respectfully submit that the above language is peculiarly effective and correct, as descriptive of the acts and asserted patent property of this complainant, so far as such property is shown to exist by this record.

Conclusion.

In conclusion, we most respectfully, earnestly and confidently submit that there appears no error of law or fact in the opinion and finding of Judge Wallace in the above entitled cause; and that from the facts and evidence thus adduced by the complainant and defendants in said cause, it is clearly apparent that neither of the asserted inventions of patents' 277,941 or 277,943, denote or tend in any way "to the progress of science or the useful arts."

Respectfully submitted.

Charles K. Offield,
Of Counsel for Appellee.